
Licens'd,

Feb. 23.
1687.

R. Midgley.

K

Academia Scientiarum:
OR THE *7.2v*
Academy of Sciences.

Being a Short and Easie

Introduction

TO THE
KNOWLEDGE

Of the Liberal

ARTS

AND

SCIENCES.

WITH

The Names of those Famous Authors that
have written on every particular Science.

In English and Latine.

By D. A B E R C R O M B Y, M. D.

L O N D O N,

Printed by H. C. for *J. Taylor*, *L. Meredith*, *T. Bennet*,
R. Wilde, Booksellers in *St. Paul's Church-yard*, *Amen-*
corner, and *Ludgate-hill*, 1687.

MVSEVM
BRITAN
NICVM

ALEX. CAMPBELL,

OF

CALDER

The Younger,

Eldest Son to

Sir HUGH CAMPBELL,

Knight Baronet, and Baron
of CALDER.

SIR,

Being of a temper quite contrary
to the flatering Genius of this
Age, I shall not follow the Ex-
ample of most Writers of Dedicatory
Epistles, and try your Patience with
long Encomiums either of Yourself, or
of

Nobilissimo, Clarissimoque Domino.

D. ALEX. CAMPBELL,

A

CALDER

Juniori,

D. HUGONIS CAMPBELL,

*Equitis Baronetti, & Baronis Calderæ,
filio natu maximo.*

Nobilissime Domine,

CUM proclivem adeo in adulationem hujus sæculi genium omnino oderim præter eorum fere omnium morem qui mecæ-
ati suo opusculum quodpiam inscri-
bunt, neque in tuas ipsius, neque in

Dedicatio.

of your Family, since the Histories, and publick Records of the Kingdom of Scotland, have given the Publick so clear, and so full an account of its Antiquity; as likewise of the Vertue, Generosity, great Atchievements, and unshaken Loyalty of your Illustrious Ancestors Yet I hope I shall not offend your Modesty, if I say, 'tis the general opinion of all your Acquaintances, both at home and abroad, that as you follow in your greener years so closely their footsteps through the Temple of Vertue, to that of Honour and Glory, so you may perhaps, improve (if possible) to a Higher pitch, those very Great and Heroick Qualities they first excell'd in. May not I then be allowed to say, without the least suspicion of flattery, that you are not only the lawfull Successor of the most Ancient, most Noble, and Loyal Family of the Thain of Calder, and of their Estate and For

Dedication.

Familiæ tuæ laudes multis excur-
ram, cum præsertim Historia ipsa
publicaque Regni *Scotia* instrumenta,
non antiquissima solum ejusdem stem-
mata, sed & virtutem, fortitudinem,
ingentia facta, inconcussamque sem-
per in reges nostros illustrium mayo-
rum tuorum fidem nec semel, nec
paucis divulgant. Nihil tamen, spe-
ro, proferam quod præ modestia ægrius
ferre debeas, si dixerò cum omnibus
sive Britannis, sive exteris quibus non
de facie tantum notus es, eorum te
vestigia quamvis adhuc tantum ærate
florentem per Templum *Virtutis* ad
Templum *Honoris & Glorie*, tam
presso pede insequi, ut quibus illi
aliquando dotibus claruere, has re-
rum a te gerendarum splendore illu-
strioris forte aliquando fore, nec im-
merito, nec solus conjiciam. Quidni
igitur hoc loco absque ulla adulatio-
nis suspitione liceat mihi profiteri te
non modo conspicuum antiquissimæ,
nobilissimæ, fidissimæque regibus no-
stris Familiæ, ac *Thannorum Calderæ*,

Dedication.

tune, but also, that you are already possess'd of these good and great Endowments both of Body and Mind, which made them capable of the great Employments they were intrusted with, and enabled them on all occasions to render the Kings of Scotland and Great Britain such signal Services, as can never be forgotten.

But not intending a Panegyrick, which I know would be uneasie to you, who hates the least appearance of flattery, I shall not insist on this Subject; I must only tell you, that this small Treatise, since 'tis the Academy of Sciences, could not but claim a peculiar Right to your Patronage, since you have given so singular and convincing proofs of your being thoroughly acquainted with the Subject it treats of; for having seen by a lucky chance, before I had any acquaintance with yourself, your very learned and accurate Book,

Dedicatio.

opumque, quibus potiuuntur, legitimum hæredem, sed videri etiam donatum a natura iis sive corporis sive animi ornamentis, quæ ipsis ad sublimia quæque regni munera additum aperuerunt, quibus ii recte administrandis insignia Regibus tum *Scotia*, tum *magnæ Britannia* obsequia nulla proinde oblivione delenda pro re nata præstiterere.

Sed cum nullam hic Panegyrim mihi proposuerim, utpote quæ tibi vel levissimam adulationis speciem refugi-
enti ingrata foret, huic argumento pluribus non immorabor; hic tantum dicam tractulum hunc, cum *Academia Scientiarum* sit, vel eo nomine tuo deberi patrocínio quod illius argumentum intime te, penitusque nosse indiciis haud obscuris non ita pridem demonstraveris, cum enim propitio mihi casu in librum a te sane perquam docte eleganterque conscriptum prius quam mihi notus fores, incidissem statim eo paucis, compendioque animadverti

Dedicatio.

I found it to contain in short, almost all kind of useful Learning, the Systems both of the New and Old Philosophy, the choicest Flowers of Rhetorick; as likewise evident marks of a not ordinary Piety and Loyalty, especially when you conclude the whole with your Father's, as well as your own dutiful Asserting and declaring for his Sacred Majesty, who now Reigns, (then Duke,) his undoubted Right of Succession, in expressions full of affection and zeal to his Person and Service, and that at a time when Loyalty and Duty of Subjects to the Royal Family, were not only seasonable, but seem'd to be necessary; and you being hardly past the Sixteenth year of your age, I could not but be surpris'd, instead of promising Buds, to find so early Fruits both of Vertue and Loyalty.

While this directed me whither I should send this small Present, it rais'd my Thoughts in revising of it

Dedication.

madverti contineri non veteris modo novæque Philosophiæ Systemata, sed & omnem fere utilorem & alicujus momenti doctrinam, flosculosque etiam Eloquentiæ selectiores, nec non conspicua Pietatis in Deum, Fideique in Regem ubique indicia, ibi præsertim ubi sub finem operis, tuo ipsius Patrisque tui nomine, Regis nunc regantis (tum Ducis Eboracensis) certissimum avitum ad diadema jus, spirantibus ubique tuum in ipsum amorem verbis pro officio declaras, eoque tempore quo debitæ regiæ Familiæ fidei, obedientiæque declaratio non opportuna tantum, sed & necessaria omnino videbatur; cumque annum jam sextum supra decimum vix implevisses non potui non mirari maturos adeo tuo in hortulo solidæ virtutis fructus, e quo teneriores tantum adhuc flosculi habitæ ætatis ratione expectari poterant.

Dam hæc me impellerent ut tuo tractatulum hunc nomini inscriberem novam mihi provinciam imposuerunt

ut

Dedication.

it with a Paulo majora canamus, to reform it so as to make it suitable to your Character, and give it the better pretence to your Acceptance.

Only I hope, that as Travellers find some pleasure when settled at home, to review in a small Map, those vast and pleasant Countries they have visited abroad, so it may perhaps, prove some diversion in your spare hours, to consider now and then those very many Arts and Sciences, which both at home and abroad you have practised, and so successfull studied in larger Volumes.

*Though I treat nothing a fond, as the French speak, or thoroughly and to the bottom, yet besides some not despicable hints of the Material Principles of most Arts and Sciences, I do point every where at the Famed Authors, and greatest Masters of every Art and Science, that they may supply you with what my design'd brevity, and the scope
of*

Dedicatio.

ut eum scilicet ad limam denuo revocarem, quo jam tuo dignior aspectu quantumvis tibi semper impar, faciliorem ad te aditum inveniret.

Illud tantum sperare mihi liceat, ut qui longinquas regiones peragrarunt, domum reduces non absque voluptate aliqua exigua eas in Mappa revifunt, ita futurum tibi negotiis magis feriis libero non injucundum contemplari varias illas Scientias Artesque quas tanto successu grandioribus e voluminibus conquistas, domi forisque foelicer exercuisti.

Cæterum licet nihil hic penitus attingam, præter non contemnenda Artium plerarumque, ac Scientiarum principia, celebriores ubique Authores indico, ut ea tibi pluribus subministrant, quæ paucis tantum proposita mihi brevitatis ipseque tractatuli hujusce scopus a me exigebant; hac itaque non injucunda scribendi methodo, quicquid de opere ipso censeas, forte fiet ut & concilium meum probes, & propo-

Dedicatio.

of this Treatise, would not allow me to
enlarge upon ; and so this not unplea-
sant method, whatever you think of the
performance, may perhaps reconcile you to
my design, of adding, though but little,
to your greater improvements, while at
the same time I shew to the World with
what zeal I am,

S I R,

Your truly Affectionate Friend,

and Humble Servant,

D. Abercromby.

Dedication.

propositam mihi metam ; eo enim
hoc opusculo collimavi, ut quidpiam
quamvis modicum præclaris animi tui
ornamentis adderem, dum interim pa-
lam profiteor quam non fîcte haberi
velim tibi, tuoque ubi res feret, obse-
quio addictissimus.

David Abercromby.

T H E
P R E F A C E.

BEcause of the shortness of Humane Life, and the little leisure of most Men to read large Volumes, an accurate and easie method for attaining to a general, and yet in some measure, sufficient Knowledge of most Arts and Sciences, has been long wish'd for, but never, for ought I know, undertaken, or at least, so compendiously, and so usefully performed, by any perhaps, either at home or abroad. For,

1. I have set down in these Papers, a part of what I judg'd most material in every Science; as likewise fittest for every common capacity, that so this Treatise may prove of a more general use.

2. I

P R Æ F A T I O.

CUM per humanæ vitæ brevitatem, otiumque ingentia evolvere volumina plerisque hominum non liceat, accuratam, facilemque methodum qua generalem quis, & tamen quæ aliquatenus sufficiat, Artium præcipuarum Scientiarumque notitiam assequeretur, diu multumque plurimi exoptarunt, quam tamen indigenarum nemo, quod sciam, aut etiam alienigenarum scribendam adhuc suscepit, aut eo saltem, quo hic tradita est, compendio, fructuque forte hactenus conscripsit: primo enim quicquid præcipui quavis in Scientia momenti, & quicquid communem ad captum magis appositum judicavi, idcirco adduxi in medium ut eo pluribus tractatulus hic usui foret.

The Preface.

2. I have called it the Academy of Sciences, because here, as in an Academy, you may learn most of the noblest Arts and Sciences, especially if you peruse often what is offered to you in these few sheets: But if you desire to know more, though perhaps most Gentlemen will think this enough, I have supplied you with good Authors, who will give you a further, Instruction, if you are at leifure to consult them.

3. The Virtuosi are concern'd in this Treatise, because it contains an Abridgment of what they have already learn'd, together with the Names of the Famed Authors that have treated of the Subject; which is no inconsiderable advantage, the Learned as well others, being sometimes at a loss when they write Books, what Authors treat of this or that Subject; wherein by having this Treatise at hand, they may be soon satisfied.

Præfatio.

2. *Academiam Scientiarum* inscripsi ; hic enim velut in Academia Artes pleraque, Scientiasque nobiliores discere poteris si præsertim sæpius relegas quæ breve hoc scriptum tibi proponit : At si penitus omnia, pluraque scire volueris, quamquam nobilium plerique sat multa hæc forte existimaturi sint, probatos tibi suggesti Authores, qui te plura docebunt si quidem per otium eos consulere tibi liceat.

3. Jam eos quoque qui ingenuis artibus ingenium excoluere opusculum hoc spectat, utpote eorum compendium quæ jam didicere, complexum, celebriorumque proposito super argumento nomina Authorum : Quod non exiguæ quid utilitatis est cum etiam docti aliquando, perinde atque alii nesciant, dum libros scribunt, quis de hac, illave re egerit ; quod seposito hujuscemodi ad usum hoc libello cito discent.

The Preface.

I have written it both in English and Latine, to gratifie such as understand but one of the said Tongues.

4. For methods sake, in the order of the Sciences set down here, I have followed the Alphabet as far as conveniently I could, beginning with those whose first letter of their Names is A, and then with those whose first letter is B, &c. which engag'd me to keep the Greeke and Latine Names, as the most known, and the fittest for this purpose.

I need not now tell you, that this Treatise is of singular use to all sorts of Persons, of what condition soever, and not to Scholars only, but likewise to Masters, who have here in a few lines, what they may teach such as are committed to their trust; yea, the very Ladies themselves, by the perusal

Præfatio.

Cæterum tum Anglico eum, tum Latino idiomate eo consilio scripsi, ut his inservirem qui alteram linguarum illarum non intelligerent.

4. Methodi gratia in serie Scientiarum hic exhibita, Alphabeti ordinem, quantum commode potui secutus sum, initio ab iis ducto quarum nomina littera *A*, tum ab iis quarum nomina littera *B* inchoat, &c. unde factum est ut voces Græcas & Latinas, utpote maxime notas, huncque in scopum magis idoneas retinuerim.

Frustra jam hic subjungerem tractatum hunc summe utilem fore omni hominum generi, ætati, conditioni, neque discipulis tantum, sed & Magistris quæ hic perpaucis habent quæ suæ commissos curæ docere queant: Quin etiam ipsæ fæminæ hujus tractatuli lectione exiguaque docentis

The Preface.

perusal of this Treatise, and a little help, may be furnish'd with such a variety of Knowledge, as may supply their not being bred in Universities.

The

Præfatio.

le
4
p-
er.
tis opera eam cognitionis varietatem compare sibi poterunt, quæ educationis, qua carent, Academicæ, supplementum quoddam videri possit.

Acad-

Some Books Printed for, and Sold
by John Taylor, at the Ship in
St. Paul's Church-yard.

A Free Enquiry into the Vulgarly Re-
ceiv'd Notion of Nature, made in
an Essay, address'd to a Friend. In *English*
and *Latine*, for the Benefit of Forreiners.
By R. B. Fellow of the *Royal Society*.

The Declimations of *Quintilian*, being
and Exercitation or *Praxis* upon his
Twelve Books, concerning the Institu-
tion of an Orator. Translated (from the
Oxford Theater Edition) into *English*, by
a Learned and Ingenious Hand, with the
Approbation of several Eminent School-
masters in the City of *London*.

The Happy Ascetick, or the best Exer-
cise; with a Letter to a Person of Quality,
concerning the Lives of the Primitive
Christians. By *Anthony Horneck*, D. D.
Preacher at the *Savoy*.

1

old
in

Re-
in
life
ers

ing
his
tu-
the
by
the
ol-

er-
ty,
ive
D

THE
ACADEMY
OF
SCIENCES

Section I.

Algebra.

Algebra, or the Analytical
Doctrine, is the Art of find-
ing an unknown Magnitude
taking it as if it were known
and finding the equality between it and
the given Magnitudes: It implieth
then a dissolving of what is suppos'd to
be compounded, which is meant by the
Greek word αναλυσις, or Resolution:
This

ACADEMIA SCIENTIARUM.

Seçtio Prima.

Algebra.

Algebra five Doçtrina Analytica est ars inveniendi magnitudinem incognitam eam accipiendo quasi cognita foret, inveniendoque æqualitatem eam inter, datasque magnitudines. Sonat itaque *Resolutionem* ejus quod compositum supponitur, hicque Græcæ vocis *ἀνάλυσις*, sensus est : Hoc

4 The Academy of Sciences.

This Name may upon this account be given to the common operations of Arithmetick ; as for instance, to what we call Subtraction, Division, Extraction of Roots, &c. for Subtraction is nothing else but a Dissolution or Resolution of what is suppos'd to be compounded, or made up by Addition ; and Division a resolution of what is suppos'd to be made up by Multiplication ; as likewise Extraction of the square Root, is a resolution of what is supposed to be made up by squaring : But such resolutions being easie, are not called Algebra, for the resolution of things, whereof the composition is more intricate, is more properly understood by this harsh word.

The Arabs call it Algibr Walmo-kabala , from the first of these two words we call it Algebra, which taken together, imply the Art of Restitution and Resolution. Lucas de Burgo, the most ancient European Algebrist, calls it the Rule of Restauration and Opposition.

And

proinde nomen tribui poterit communibus Arithmeticae operationibus, puta Subtractioni, Divisioni, Extractioni radicum quadratarum, &c. Subtractio enim nihil aliud est quam resolutio ejus quod ex Additione supponitur emerfisse, compositi, Divisio quid? nisi resolutio ejus quod ex Multiplicatione supponitur emerfisse, compositi, Extractioque radicis quadratae nil aliud est quam resolutio ejus quod ex quadratione supponitur emerfisse, compositi: Sed hujuscemodi resolutiones utpote faciliores *Algebrae* nomine intelligendae non veniunt, difficultas enim compositionum resolutio barbara hac voce, & magis proprie intelligitur.

Arabibus dicitur *Algiabr Walmokabala*, a priore voce nos *Algebram* dicimus, geminae enim voces simul sumptae artem restitutionis, ac resolutionis sonant. *Lucas Burgenfis* antiquissimus inter Europaeos *Algebrista* *Algebram* *Restorationis* & *Oppositionis* regulam vocat.

6 The Aacademy of Sciences.

And indeed, this is its chief work ; a quantity unknown, which they commonly call Root, is supposed by Additions, Substractions, Multiplications, Divisions, and other like Operations, to be so chang'd, as to be made equal to a known quantity compared with it, or set over against it ; which comparing is commonly called Equation, and by resolving such an Equation, the Root so changed, transformed or luxated, is in a manner put into joynt again, and its true value made known, for the word Giabara, from which the word Algebra is derived, does signifie, to restore or set a broken Bone or Joynt.

Theo says, that Algebra was invented by Plato ; however the chief Writers of Algebra are those whose names I have set down here, to gratifie such as would learn this noble Art.

Lucas Pacciolus, or Lucas of Burgo, a Minorita Fryer, wrote an Italian Treatise of Algebra, in Venice, 1494. a little after the Invention of the Art of Printing ;

Et reipsa præcipuum hoc ejus opus est, quantitas adhuc incognita quam vulgo Radicem dicunt, quibusdam Additionibus, Subductionibus, Multiplicationibus, Divisionibus, aliisque id genus operationibus ita supponitur mutata, ut tandem æqualis fiat quantitati notæ eidem comparatæ, aut e regione ejusdem collocatæ, quæ comparatio æquatio dici solet: Hujus autem æquationis resolutione radix hunc in modum mutata, aut quasi luxata, priori rursus, ut ita dicam, situi restituitur, verusque ejus valor innotescit, vox enim *Giabara* unde *Algiabr* desumitur, fracti ossis restorationem sonat. inventam asserit a *Platone* Algebram *Theo*; ut ut sit præcipui *Algebrae* Scriptores hi sunt quorum nomina hic ap-pono in eorum gratiam qui nobilem hanc artem discere voluerint.

Lucas Pacciolus, aut *Burgensis*, *Italicum* de *Algebra* Tractatum scripsit *Venetiis* Anno nonagesimo quarto supra millesimum quadringentesimum

8 The Academy of Sciences.

Printing ; there he mentions Pisanus, and several others that had written on the same Subject before him, but their Works are not Extant. Harriot, Oughtred, Descartes, Huddenius, Gelleus, Billius, and lately the fam'd Dr. Wallis has written a large Volume on this Subject.

SECT. II.

Arithmetick.

ARithmetick is the Art of Numbering ; 'tis either Practical or Speculative ; the Speculative Arithmetick contains some general truths relating to Numbers : As for instance, Unity is the beginning of every Number ; a Number is a Multitude compounded of Unites. An even part of a Number is that which by Multiplication produceth that number. As 2 is an even

paulo post inventam Typographiam ;
ubi commemorat *Pisanum*, aliosque
non paucos qui de eodem argumento
prius scripserant, at eorum opera jam
non extant. *Harriotus*, *Oughtredus*,
Cartesius, *Huddenius*, *Gelleus*, *Billius*,
ac nuperrime celeberrimus *Vallisius*
hoc super argumento amplum volu-
men edidit.

Sectio Secunda.

Arithmetica.

Arithmetica est ars numerandi ;
est autem practica aut specula-
tiva ; hæc manifeste vera quædam,
& generalia de numeris pronunciata
complectitur : Cujuscemodi ea sunt
quæ sequuntur. *Omnis numeri prin-*
cipium est unitas ; numerus est multi-
tudo ex unitatibus composita. Pars
aliquota numerica est quæ numerum me-
suratur. Ita numerus hic 2 est pars
aliquota

10 The Academy of Sciences.

even part of 10, because 2 multiplied by 5, give 10.

An uneven part of a number is that which by Multiplication produceth not that number. Thus 3 is an uneven part of 10, because however multiplied, it shall never produce this number 10.

The proportion of Numbers is either according to their excess, defect, or equality, for that thing has some proportion to another that is either less, greater, or equal. A perfect number is that which is equal to all its even parts: The first perfect number is 6, for all its even parts are 1, 2, 3, which together give 6. The next perfect Number is 28, for all its even parts are 1, 2, 4, 7, 14, which by Addition give 28.

These ensuing notions likewise may be referr'd to the Speculative part of Arithmetick,

To Multiply one number by another, as 4 by 2, is to take the Multiplicand 4 as many times as the Unity may be taken
in

aliquota numeri hujus 10, quinques
nim 2 sunt 10.

Pars aliquanta numeri est ea quæ
numerus non metitur. Ita numerus
6 3 est pars aliquanta numeri hujus
10 ; ter enim sumptus dat 9, & qua-
ter dat 12.

Proportio numerorum est nume-
rorum consideratio juxta excessum,
defectum aut æqualitatem : Illud
enim ad aliud proportionem habet,
quod aut minus, aut majus, aut æquale
est.

Perfectus numerus dicitur qui om-
nibus suis partibus paribus æqualis est.
Primus perfectus est 6, illius enim om-
nes partes pares seu aliquotæ sunt
1, 2, 3, quæ simul additæ dant 6. Se-
cundus est 28 ; nam illius omnes par-
tes aliquotæ seu pares sunt 1, 2, 4, 7,
14, quæ simul additæ 28 producant.

Subsequentes pariter notiones ad
Arithmetica speculativam referri
poterunt. Unum numerum per alium
multi

in the Multiplier 2, and so 4 being multiplied by 2, the Product must be 8.

To divide one number by another; as for instance, 8 by 2, is to find out how many times 2 are contained in 8.

A plain number is the product of two numbers multiplied the one by the other; 12 then is a plain number, because it is the product of 6 multiplied by 2.

A Solid number is the product of three numbers multiplied, such is 24, because 'tis the product of those three numbers multiplied 2, 3, 4, for multiplying 2 by 3 I have 6, and 6 by 4 I have 24.

A Square number is the product of two equal numbers multiplied by one another, or of the same number multiplied by itself. 4 Is a Square number, as being the product of 2 multiplied by 2, and 2 is called the Square Root.

A Cube is the product of three equal numbers, or of the same number thrice taken; for if you multiply 2 by 2, you have

multiplicare seu in alium ducere ut 4 in 2 est toties sumere multiplicandum quoties sumi potest in multiplicatore 2 unitas: Quare si 4 ducas in 2, summa futura est 8. Unum numerum dividere per alium ut 8 per 2 nihil aliud est quam invenire quoties 2 contineantur in 8. Numerus planus a duobus numeris in se invicem ductis producitur, 12 igitur est numerus planus quia producitur a numero 6 in 2 ducto.

Solidus numerus a tribus numeris multiplicatis oritur: Ejusmodi est 24, ex tribus enim hisce numeris multiplicatis emergit 2, 3, 4; si enim 2 duco in 3 habeo 6, & si duxero 6 in 4, habeo 24. Numerus quadratus producitur a duobus æqualibus numeris in se invicem ductis, cujusmodi est 4: Oritur enim a numero 2 in 2 ducto, qui radix quadrata dicitur.

Cubus oritur ex multiplicatione trium numerorum æqualium, aut ejusdem numeri ter assumpti ita 8 cubus primus

14 The Academy of Sciences.

have 4; and if you multiply 4 by 2 again, you have 8, and 8 is called the Cube Root.

That part of Arithmetick that relates to the Practice, contains, First Addition, which is the gathering of many numbers into one Sum; as if I add 4 to 6, the whole is 10. Secondly Subtraction, as if I take 4 from 6, there remains 2. Thirdly, Multiplication, as if I enquire how many are four times six, and I find 24. Fourthly, Division, as if I enquire how many times 6 are contained in 24, and I find them to be contain'd four times in 24. Fifthly, the Fractions. Sixthly, the Decimal Fractions, invented to supply broken numbers, very troublesome to Practitioners. Seventhly, the Extraction of Roots, Cubic and Square. Eighthly, the four Rules of Proportion, of Society, Alligation, Falshood, the Doctrine of Progressions.

primus ex multiplicatione numeri 2
ter assumpti, producitur, si enim 2 du-
cas in 2 habes 4, & si 4 rursus ducas
in 2 habes 8, & 2 radix cubica dicitur.

Pars illa Arithmeticae quæ spectat
praxim complectitur primo Additio-
nem quæ est plurium numerorum
in unam summam collectio, ut si ad-
dam 2 huic numero 6 summa integra
futura est 8. Secundo, Subtractio-
nem ut si 4 subduco e numero 6, super-
sunt 2. Tertio, Multiplicationem, ut
si inquiram quot constituent quater 6,
comperiam 24. Quarto, Divisionem
ut si inquiram quoties 6 contineantur
in 24 comperioque 6 in 24 quater con-
tineri. Quinto, Fractiones. Sexto,
Fractiones Decimales ad supplemen-
tum Fractionum practicis permolestarum
excogitatas. Septimo, Extra-
ctionem radicum cubicarum, ac qua-
dratarum. Octavo, Regulas propor-
tionum, societatis: alligationis, fal-
si, & doctrinam progressionum.

16 The Academy of Sciences.

We may reckon the ensuing Authors among the best Arithmeticians. Simon Stevinus invented the Decimal Fractions; Neper supplies troublesome and intricate Divisions by his Rabdologick Plates, and his Logarithms; and Tacquet has given us both the Theory, and the Practice of Arithmetick; Euclid in the 7, 8, 9, and 10 of his Elements of Geometry; Jordanus, Nemorantius, Francis Maurolycus, Barlaamon, &c.

Annumerare possumus sequentes
Auctores primis Arithmeticis. *Simon Stevinium* fractionum decemalium
inventorem; *Neperum* Scotum qui
divisionis molestiam laminis suis rab-
bolicis, & logarithmis omnem sustu-
lit; *Tacquetum* qui Arithmeticæ, &
Theoriam, & praxim tradidit; *Eucli-
dem* 7, 8, 9, 10, Elementorum, *Jor-
danum*, *Nemorantium*, *Franciscum
Maurolicum*, & *Barlaamontium*, &c.

C

Sect.

Sect. III.

Judiciary Astrology.

Judiciary Astrology is that Science, by the help of which Men pretend to judge of things to come, and more especially of Mens Good and Bad Fortunes. The Judiciary Astrologers do ascribe considerable vertues to the different Conjunctions and Aspects of the Stars.

They distinguish five kinds of mutual Aspects among the Planets: The first is called a Sextile, when one Planet is distant from another the sixth part of the Circuit of the Heavens, that is to say, 60 degrees. The second is called a Quartile, when the distance is but the fourth part of the circle or 90 degrees. The third is called a Trine, when the distance is but the third part of the circle, or 120 degrees. The fourth is called an Opposition,

Sectio Tertia.

Astrologia Iudiciaria.

Astrologia Iudiciaria ea est Scientia cujus ope de rebus futuris homines pronunciant, ac præsertim de fælici aut infælici cujusque fatō. Astrologi Iudicarii insignes ascribunt virtutes diversis conjunctionibus, aspectibusque planetarum.

Quinos distinguunt aspectus planetarum. Primus dicitur Sextilis cum distat planeta unus ab alio sexta parte circuli, hoc est 60 gradibus. Secundus vocatur Quadratus cum distant invicem quarta parte ejusdem circuli, hoc est 90 gradibus. Tertius dicitur Trigonus quando tertia tantum parte, seu 120 gradibus. Quartus Oppositionis cum uterque pla-

20 The Academy of Sciences.

sition, when the two Planets are in the two opposite points of the circle, and distant from one another 180 degrees. The fifth is called a Conjunction, when the two Planets are in the same Sign of the Zodiac.

Astrologers divide the Heavens into twelve equal parts, which they call Houses; they say that every Planet has eight dignities, viz. House, Exaltation, Triplicity, Term, Chariot or Throne, Person, Joy, Face.

They say the Stars were not only made to give light: Hence 'tis they take the station, direction and retrogradation (as they speak) of a Planet to be a certain reeling, or spinning of Fates and Fortunes: They distinguish all the Constellations into so many Triangles or Trigones: The first is the fiery Trigone, comprehending Aries, Leo, Sagittarius; the second is the Earthly, comprehending those ensuing Constellations, Taurus, Virgo, Capricornus; the third is the Aerial, comprehending Gemini, Libra,

the
nd
es.
ben
of
eto
ou-
bas
ta-
or
aly
ake
ion
er-
nd
he
or
ae,
s;
e
u-
ra
ai,
a.
neta sibi oppositi sunt, disjunctique
180 gradibus. Quintus est Conjun-
ctionis cum duo planetæ sunt in eo-
dem signo Zodiaci.

Universum Cœli ambitum secant
Astrologi in duodenas partes æqua-
les, quas vocant domos seu domi-
cilia.

Octonas planetarum dignitates nu-
merant, quæ sunt domus, exaltatio,
trigonus, terminus, carpentum, per-
sona, gaudium, facies.

Stellas dicunt non creatas tantum
ad orbem illuminandum: Unde
aiunt stationem, directionem & re-
trocessum planetæ esse nescio quam
factorum revolutionem, ac quasi ne-
tionem: Constellationes omnes distin-
guunt tot in triangula seu trigona:
Primum trigonum igneum dicitur,
complectiturque *Arietem*, *Leonem*,
Sagittarium; secundum terrestre ap-
pellatur, continetque *Taurum*, *Virgi-
nem*, *Capricornum*; tertium aerium
est complexum *Geminos*, *Libram*,
C 3 *Aqua-*

22 The Aacademy of Sciences.

Libra, Aquarius; *the fourth Trigon*
is the Watery, comprehending Cancer,
Scorpius, Pisces.

If you desire to know more particularly
the Principles of this Science, you may
consult these following Authors. Van-
nius, Butler, Cardan, Gadbury, Al-
bottazen, Haly, Julius Firmicus, Jo-
hannes Jovianus Pontanus, Peze-
lius, &c.

Sect.

gon
cer
Early
may
Van-
Al-
Jo-
ze-
rium; quartum appellatione aqueum,
continet *Cancrum*, *Scorpium*, *Pis-
ces*.

Si propius hujus Scientiæ prin-
cipia intueri volueris, consulere po-
teris hos sequentes Authores, *Van-
nium*, *Butlerium*, *Cardanum*, *Gadbu-
rium*, *Iustinum*, *Philippum Melancto-
num*, *Origanum*, *Ptolomæum*, *Alboha-
zen*, *Haly*, *Julium Firmicum*, *Jo-
hannem Fovianum Pontanum*, *Peze-
lium*, &c.

SECT. IV.

Astronomy.

Astronomy gives us an account of the Motions of Cælestial Bodies, of their distance, order, bulk, &c. The Babylonians will have Belus to have been the Inventor of it, the Ægyptians Mercury, the Moors Atlas and Hercules, the Grecians Jupiter, Orpheus and Atreus, the Scythes Prometheus. We may divide it into two Parts, the one Spherical, and the other we may call Systematical. The Spherical is that part of Astronomy which treateth of the Sphere, whether Artificial or Natural; the Artificial Sphere is made up of ten circles, whereof six are great ones, because they divide the whole Sphere into two equal parts, such we reckon the Horizon, the Meridian, the Equator, the two Colures, and the Zodiack. The little Circles are those that divide the Sphere
into

Sectio Quarta.

Astronomia.

Astronomia describit corporum Cœlestium motum, distantiam, ordinem, magnitudinem, &c. Illius inventorem *Babylonii* volunt esse *Belum*, *Ægyptii* *Mercurium*, *Mauri* *Atlantem* & *Herculem*, *Græci* *Jovem*, *Orpheum* & *Atreum*, *Scythæ* *Prometheum*. Eam dividere possumus geminas in partes, alteram Sphæricam, alteram appellare possumus Systematicam. Sphærica est ea pars Astronomiæ quæ agit de Sphæra, sive arte facta, sive naturali : Sphæra arte facta constat 10 circulis quorum 6 sunt majores quia dividunt Sphæram in duas partes æquales ; cujusmodi numeramus horizontem & meridianum æquatorem, colurosque duos æquinoctii, & solstitii, & zodiacum. Minores circuli sunt ii qui Sphæram in duas partes inæqua-

26 The Academy of Sciences.

into two unequal parts, as the two Tropicks, and the two Polar Circles : Every circle is divided into sixty parts, which they call first minutes ; and each Minute likewise into sixty parts, which we call second Minutes.

The Natural Sphere, or the Cælestial Globe, besides the foregoing Circles, offers to our view divers Constellations : The Antients reckon'd eight and forty, comprehending in this number all the Stars to be seen in Greece, and all the known Parts of the World ; 12 of those Constellations are contain'd in the Zodiack, 21 are to be seen toward the North, and 15 towards the South ; but of late there are twelve other Constellations discovered towards the South.

The Systematical Astronomy, which others call the Theorical, is that part which by the help of some Engines and Orbs, offers to our view those Cælestial Motions which are not so obvious to every common understanding.

This

inæquales dividunt : Cujusmodi sunt duo tropici, totidemque polares : Quivis circulus dividitur in gradus 360, & quivis gradus in 60 particulas, quas prima minuta vocant ; & minutum primum in sexaginta partes quas secunda minuta dicimus.

Sphæra naturalis, seu Globus cœlestis præter commemoratos circulos aspicientibus exhibet varias constellationes : Antiqui octo supra quadraginta constellationes numerabant : Quo numero comprehendebant omnes stellas in *Græcia* conspicuas, atque in omnibus cognitis tum mundi partibus : 12 constellationes continebat zodiacus, 21 apparent ad boream, 15 ad austrum, versus hanc partem duodecim nuper aliæ detectæ sunt.

Astronomia Systematica quam alii Theoricam vocant est ea Astronomiæ pars quæ aspectui nostro exhibet ope quarundam Machinarum Orbiumque eos cœlestes motus qui omnibus non æque obvii sunt.

Hæc

28 The Academy of Sciences.

This part of Astronomy comprehends several Hypotheses, as that of Anaxagoras and Democritus, who allowed a free motion to the Stars, but of no first Mover, or Primum mobile: Neither did they admit any second motion towards the East, but a simple motion only towards the West; so in their Opinion, those Stars only could be said to move toward the East, that moved more slowly towards the West. There is another Hypothesis that considers the Stars as tied to solid Spheres; and who hold this Hypothesis, hold likewise the Earth to rest in the Centre of the World.

Copernicus allows motion to the Earth; he fixeth the Sun in the Centre of the World, though it turns round about its own Axis within seven and twenty days, as 'tis manifest by the motion of its spots. 1. In this System, the Orb of the fixed Stars is immoveable. 2. Mercury turns round the Sun in almost three months. 3. Venus in four months
and

Hæc Astronomiæ pars varias complectitur hypotheses cujusmodi est hypothesis *Anaxagoræ* ac *Democriti*, qui motum astris liberum assignabant sed nullum admittebant Primum mobile; neque ulla proinde solidis Sphæris alligabant sydera: Nec ullum secundum in ortum concedebant motum, sed simplicem tantum in occasum: Ita juxta eorum sententiam ea tantum sydera moveri dicuntur in ortum, quæ lentius moventur in occasum: Alia quædam est hypothesis quæ sydera, ut solidis alligata Sphæris intuetur; quique hanc hypothesis tenent terram in centro mundi quietam volunt.

Copernicus motum terræ attribuit; solem constituit in centro mundi immotum, licet proprium circa axem moveatur spatio viginti septem dierum ut patet e motu ejusdem macularum in hoc systemate. 1. Orbis fixarum immotus est. 2. *Mercurius* spatio fere trium mensium circa solem vertitur. 3. *Venus* intra

30 **The Academy of Sciences.**

and a half, and the Earth itself in twelve months, and round the Earth the Moon turneth every month. 4. Mars's revolution round the Sun is ended in almost two years, as Jupiter's in twelve years, and Saturn's in thirty.

Tycobrahe orders his System thus: First the Firmament, or the Sphere of the fixed Stars, the Earth being the Centre of the World; then the Orbs of Saturn, Jupiter and Mars; Venus and Mercury turn round the Sun, and the Moon round the Earth.

The Old System was ordered thus: The Earth was the Centre of the World, above it were plac'd the Planets and Heavens in this order; the Moon, Mercury, Venus, the Sun, Mars, Jupiter, Saturn, the two Chrystalline Heavens, and the Primum mobile.

intra quatuor menses, & semissem, terraque ipsa duodecim mensibus, circaque terram quolibet mense gyrat Luna. 4. Martis periodus circa solem absolvitur duobus fere annis, ut Jovis duodecim, Saturnique spatio triginta annorum.

Suum *Tycobrahe* systema ita constituit. Firmamentum, seu cœlum fixarum primo loco statuit: Mundi centrum terra est; fixarum cœlo succedit cœlum Saturni, tum Jovis, & Martis, Venus & Mercurius circa solem gyran luna circa terram movetur.

Antiquum systema ita se habebat: Terra mundi centrum occupabat; supra illam erant aqua, aer, & ignis, succedebant planetæ cœlique hoc ordine, Luna, Mercurius, Venus, Sol, Mars, Jupiter, Saturnus, Firmamentum, duo cœli chrySTALLINI *Primum mobile*.

Authors.

Ptolomy, Aratus, Eudoxus, Calippe,
Tycobrahe, Gassendy, de Billy, Cour-
cier, de Sacrobosco, Fracastorius, Ga-
lilæus.

Sect. V.

Military Architecture.

ARchitectonica Militaris, or *Military Architecture*, is the Art of Fortifying. This Art teacheth us how to encline towards the Angles of a Poligone, that is, a Figure of many Angles, certaines lines upon which the Fortress is to be built in such a manner, that the Enemy by whatever side he makes his approach, may be beat back by the lesser number.

Every point of the circumference of the Fortress must be defended by some

Authores.

Ptolomæus, Aratus, Eudoxus, Calippus, Tycobrahe, Gassendus, Billius, Courcierius, de Sacrobosco, Fracastorius, Galilaus.

Sectio Quinta.

Architectonica Militaris.

Architectonica Militaris est ars muniendi, ars autem muniendi docet qui inclinare debeamus ad angulos polygoni hoc est figuræ variis terminatæ angulis lineas quasdam super quibus propugnaculum ædificandum est, ita ut hostis quacumque parte invadat, minoribus viribus repelli possit.

Omne punctum in procinctu muniementi debet defendi ab alia parte.

34 The Academy of Sciences.

other part of the same.

According to the Holland method of Fortifying, the Angle of the Bastion, or the Flanqued, and Defended Angle exceeds always by 15 degrees the half of the angle of the Polygone; upon this account 'tis that the angle of the Bastion is never streight, or of 90 degrees, unless in a place defended by 12 Bastions; but in places defended by more than 12, it is always streight.

According to the French method, if the Polygone be a triangle, the angle of the Bastion contains 45 degrees; if it be a Pentagone, or of five angles, it contains 78 degrees; if the Polygone have more than five sides, the angle of the Bastion is streight, or is open 90 deg.

Authors.

Errard of Barleduc, Samuel Marolois, Adam Fritach, Stevin *in* Italian, de Lorini, del Cavallero Francisco Tensimi, del Cavallero Alessandro Barone, de Groote, Herigone.

Sect.

Juxta methodum muniendi *Hollandicam* angulus propugnaculi, aut defensus excedit semper quindecim gradibus semissem polygoni, quomobrem angulus propugnaculi nunquam est rectus nisi locus duodecim propugnaculis defenditur, quoties autem locus pluribus, quam duodecim propugnaculis munitur, rectus semper est.

Juxta *Gallicam* muniendi methodum si munitum polygonum triangulum fuerit, angulus polygoni est graduum 46, si pentagonum fuerit, angulus propugnaculi est gradibus 78; si polygonum constet pluribus quam quinque lateribus, angulus propugnaculi est rectus, aut 90 graduum.

Authores.

Errardus Barneto-duceus, Samuel Marolois, Adamus Fritachius, Stevinus Italice, de Lorini, Franciscus Tensimi, Herigonius, &c.

Sect. VI.

The Military Art.

THe Military Art of the Greeks and the Romans was on several accounts different from that of this Age.

Of old an ordinary Grecian Army did contain 28672, among whom we reckon not those that were upon the Elephants, who were sometimes in greater numbers, sometimes in lesser. This Army was divided into Horse and Foot: The Foot was divided again into Oplites and Psiles, the Oplites were those that wore a heavy Armour, the Psiles were slightly Arm'd.

The number of the Oplites was always double of the number of the Psiles, and the Psiles double of the number of the Cavalry. All the Oplites of the Phalange were put in one Battalion, whereof the Front contained 256 men, and the Wing 16.

of

Sectio Secta.

Ars Bellica.

ARS Bellica, seu Militaris tum *Græcorum*, tum *Romanorum* varie discrepabat ab hodierna recentiorum.

Communis Græcorum exercitus numerabat 28672, quibus non annueramus qui Elephantis infidebant qui non eundem semper numerum constabant, sed interdum majorem, minorem interdum. Hic exercitus dividebatur in equites, peditesque, pedites rursus in Oplitas & Psilos, Oplitæ erant gravis armaturæ milites, Psili levis armaturæ.

Numerus Oplitarum duplus erat numeri Psilorum, & Psili equitum numerum geminabant. Omnes Oplitæ unius Phalangis uno colligebantur in agmine cujus frons constabat 256, & ala 16.

38 The Aacademy of Sciences.

Of all the Pfiles of the Phalange, the Grecians made two Battalions, each having 128 men on a breast, and 8 in the flanks; all the Cavalry of the Phalange was divided into 16 squar'd Turmes or Troops, whereof each did contain 64 men.

In a Grecian Army made up of four Phalanges, there were four Battalions of Oplites, 8 of Pfiles, and 64 Troops of Horse.

In a Roman Legion there were four different sorts of men, not only as to Age, Riches, Warlick Science, but likewise on the account of their Arms, and way of Fighting; for of the younger and poorer sort (as Polybius assures us) they made their Velites; those that were somewhat above them upon the account of their age and riches, were Halbardeers, or Hasteries; such as were richer, and in the full vigour of their age, were Princes; and the oldest and most experienced, were the Triaries.

Ex omnibus Pſilis Phalangis conſtituebant Græci duo agmina, a fronte ſtabant viginti octo ſupra centum, a latere octo. Omnes equites Phalangis diſtribuebantur in turmas quadratas ſedecim, quarum quælibet quatuor ſupra ſexaginta milites continebat.

In exercitu Græcō ex quadruplici Phalange conflato quatuor erant agmina Oplitarum, octo Pſilorum, & ſexaginta quatuor turmæ equitum.

Romana legio quatuor complectebatur hominum Genera diverſa non ætate tantum, divitiis, ſcientiaque Bellica, ſed & armis, modoque pugnandi: Ex junioribus enim, pauperioribusque, ut teſtatur *Polybius* ſeligebantur Velites, ex proximis haſtarii, ex ætate florentibus Principes, ſenioresque, & magis experti ſeligebantur in Triarios.

The number of the Soldiers of every one of those different sorts, was different in different times, according as the Legion was less or more numerous. When the Legion did amount to 4200, as it did in Polybius his time, there were 600 Triaries in the Legion, and 1200 of every one of the three other sorts, to wit, of Princes, Hastaries, and Velites. When the Legion was more numerous, those three different sorts were likewise encreased, the Triaries only excepted, who were always the same number.

In the Militia of this Age, there is no such repartition observed, the Armies being not always divided into parts made up of the same numbers; for some Regiments have 10 Companies, others 15, others 20, &c. Likewise the Companies have not always the same number, some being a hundred men strong, others one hundred and twenty, others one hundred and fifty, &c.

Numerus militum ex quibus diversi illi ordines constabant diversis temporibus diversus erat ; prout legio magis, minusque numerosa erat. Cum legio constabat ducentis supra quatuor millia, ut temporibus *Polybii* constabat ; sexcenti erant Triarii in legione, ducenti supra mille in quovis ordinum reliquorum, scilicet Principum, Hastariorum, & Velitum : At numerosiore jam legione tres varii ordines numerosiores omnes reddebantur, exceptis tantum modo Triariis quorum numerus idem semper erat.

In Militia hujus sæculi nulla hujusmodi distributio observatur, cum exercitus non dividatur in partes eodem semper numero constantes : Quædam enim legiones constant 10 cohortibus quædam 15, quædam 20, paucioribus aut pluribus ; cohortes pariter non semper eodem constant numero : Quædam enim constant 100 militibus, aliæ 120, aliæ 150 &c.

42 The Academy of Sciences.

In this Age an Army is drawn up in Battel, or three Lines, and the French divide sometimes every Line into several little Bodies; the Turks give sometimes to their Army the figure of a Cerscent.

The Camp, especially if the Enemy be near, ought to be in some place where there is a great abundance of Water, and Provisions: And if the Army is to make a long stay, 'tis to be observed if the Air be good.

Ye are not to Encamp near a Hill, which being taken by the Enemy, might incommode your Camp.

Authors.

Polybius, Stevin, Herigone.

Sect.

Hoc sæculo exercitus pugnaturus in tres ordines distribuitur; Galli unumquemque ordinem in varia agmina quandoque distribuunt, Turcæ exercitum interdum ordinant in formam lunæ crescentis.

Castra, maxime si in propinquo fuerit hostis debent figi in loco tuto ubi magna adsit aquarum copia, comatusque, & si diuturnior esse debeat exercitus mora, videndum an aura illic salubris sit.

Cavendum autem imprimis ne castra prope montem statuantur, qui ab hoste occupatus exercitui noxius esse posset.

Authores.

Polybius, Stevinus, Heregonius.

Sect.

SECT. VII.

Cosmography.

Cosmography is a Description of the World, and its chief Parts..

The World is the Highest Heaven, and whatever it contains, it is divided into the Sublunary Region, and the Cæstial: The Sublunary Region is obnoxious to divers Changes, and is contained in the concave surface of the Orb of the Moon: It contains the four Elements, the Earth, the Water, the Air, the Fire.

The Semi-diametre of the Earth contains about 3436 Italian miles.

The ordinary depth of the Sea is 500 Geometrical paces.

The Surface of the Earth is almost equal to the Surface of the Sea, and somewhat higher, because we see that Rivers from their first rise to the Sea go always downwards.

The

*Sectio Septima.**Cosmographia.*

Cosmographia est descriptio mundi, præcipuarumque ejusdem partium.

Mundus est cælum altissimum, & quicquid eo comprehenditur, dividitur in regionem sublunarem, & cœlestem, regio sublunaris variis est obnoxia mutationibus, contineturque concava cæli lunaris superficie, quatuor complectitur elementa, terram, aquam, aerem, ignem.

Semi-diameter terræ quadringenta fere & triginta sex supra tria millia, milliaria Italica complectitur.

Communis marium altitudo est passuum Geometricorum quingentorum.

Superficies terræ est fere æqualis superfici ei maris, atque aliquanto altior, quia animadvertimus flumina ab ipsa origine ad mare descendere, seu deorsum tendere.

Pu.

The Divines think that the Earth was entirely round, and surrounded with Waters on all sides, but after God had commanded the Waters to retreat, so many Hills were made as there are Concavities to receive the Seas.

The Cælestial Region is that part of the World which is extended from the concave surface of the Heaven of the Moon, to the convex surface of the Highest Heaven; which space comprehends the Heavens of all the Stars.

Astronomers distinguish three sorts of Spheres; the first is streight, when the Equator maketh streight angles with the Horizon; the second is oblique, when the Intersection of the Horizon and Equator makes oblique angles; the third is the Parallel Sphere, when the Equator and the Horizon are joyned together.

Astronomers conceive ten Points, and ten chief Circles in the concave superficies of the first Mobile: The Points are the two Poles of the World, the two Poles of the Zodiack, the two Equinoctial, and two Solsticial Points, Zenith and Nadir.

The

Putant Theologi terram initio rotundam fuisse, atque aquis undique circumcinctam: Sed postquam Deus aquas recedere jussisset, tot erupere montes, quot sunt concavitates aquis marinis recipiendis idoneæ.

Regio cœlestis est ea pars mundi quæ porrigitur a superficie concava cœli lunaris ad superficiem convexam altissimi cœli, quod spatium cœlos omnium stellarum comprehendit.

Astronomi triplicem sphaeram distinguunt prima est sphaera recta quando æquator rectos cum horizonte angulos constituit; secunda est obliqua cum intersectio æquatoris, & horizon constituit obliquos, tertia est parallela cum æquator, & horizon sibi congruunt, aut conjunguntur.

Astronomi in concava primi mobilis superficie concipiunt 10 puncta, totidemque primarios circulos: Puncta sunt duo mundi poli, duo poli zodiaci, duo puncta æquinoctialia, duo puncta solsticialia, Zenith & Nadir.

Cir-

48 The Academy of Sciences.

The Circles are the Horizon, Meridian, Equator, Zodiack, the Colures of the Equinox, and the Colures of the Solstice. The Cancer and Capricorne, the Arctick and Antarctick circles; by Zenith and Nadir we understand two points, the first directly answering to our Heads, and the second to our Feet.

Astronomers fancy divers Motions in the Heavens: the Primum Mobile turns round with it all the other Orbs in 24 hours. They allow to the other Heavens under the first Mobile a motion of Libration from the North to the South, and from the South to the North.

The Eclipse of the Moon is a real privation of its light, by the interposition of the Earth between it and the Sun. The Eclipse of the Sun is not a real privation of light, because the Sun Eclips'd, is only hid from our eyes by the interposition of the Moon.

All the Eclipses of the Moon are universal, or seen by all such as see the Moon; all the Eclipses of the Sun are parti-

Circuli sunt horizon, meridianus, æquator, zodiacus, colurus æquinoctiorum, colurus solstitiorum, Tropicus Cancræ, & capricorni, duoque polares : His vocibus Zenith & Nadir intelligimus duo puncta ex diametro opposita, alterum, scilicet zenith vertici nostro imminens, alterum nempe nadir, pedibus oppositum.

Astronomi varios concipiunt in cœlis motus. Primum mobile reliquos secum cœlos 24 horarum spatio circumducit : Reliquis sub primo mobili cœlis addunt motum librationis a septentrione in austrum & ab austro in septentrionem.

Eclipsis lunæ est vera luminis privatio interjectu terræ lunam inter & solem : Eclipsis solis non est realis privatio luminis. Sol enim deficiens tegitur tantum ab oculis nostris interposito lunæ. Omnes Eclipses lunæ sunt universales aut conspicuæ omnibus corpus lunare eo tempore intuitibus ; omnes Eclipses solis sunt
E parti-

50 The Academy of Sciences.

Particular ones, or not seen by every one that sees the Sun.

There are five Zones, one Torrid, two Temperate, and two Cold ones. The torrid Zone is comprehended between the two Tropicks; its breadth is 47 degrees, if we reckon according to the common Calcul $23\frac{1}{2}$ on each side of the Equator; the two temperate Zones are contain'd between the Tropicks and the Polar Circles, whereof one is South, and the other North; the breadth of both is 43 degrees. The cold Zones are contain'd within the Polar Circles, distant from the Poles of the World $23\frac{1}{2}$ degrees.

Authors.

*Peter Aerte his World, in five Vols.
Herigone, Garcy, Adrianus Metius.*

Sect.

particulares, aut non conspicuæ omnibus qui solem ipsum intueri possunt.

Quinque sunt Zonæ, una torrida, duæ temperatæ, duæque frigidaë, torrida Zona comprehenditur duobus Tropicis: Ipsius latitudo est vulgari calculo 47 graduum; nempe $23\frac{1}{2}$ cis, ultraque æquatorem; duæ temperatæ comprehenduntur tropicis, & polaribus circulis quorum alter meridionalis alter borealis est, utriusque latitudo est graduum 43; frigidaë Zonæ comprehenduntur polaribus circulis distantis a mundi polis grad. $23\frac{1}{2}$.

Authores.

Petrus de Aerte, seu mundus ipsius voluminibus, *Herigonius*, *Garcæus*, *Adrianus Metius*.

SECT. VIII.

Catoptrick.

Catoptrick is derived from *κατοπτρον* a Looking-glass, because it treats of the Rays, as being reflected by polish'd Bodies. This Science demonstrates the following Propositions.

1. If a Ray falling upon a glass, make equal angles, 'tis reflected into itself.

2. Rays reflected from plain and convex glasses, do neither come together, nor are equi-distant.

3. Heights and Depths seem to be overturned in Convex glasses.

4. In Convex glasses, what is on the left hand, appears to be on the right; and what is on the right hand, appears to be on the left.

5. If the eye were in the centre of a Concave-glass, it would see nothing but itself.

Sectio Octava.

Catoptrica.

CAtoptrica derivatur a Græca voce *Κατοπτρον*, quod speculum sonat, quia agit de radio ut reflexo a lævigatis corporibus, sequentes propositiones demonstrat.

1. Si radius in qualecumque speculum cadens æquales facit angulos ipse in seipsum reflectitur.

2. Radii a planis, convexisque speculis reflexi neque mutuo concurrent, neque erunt paralleli.

3. Altitudines & profunditates in convexis speculis inversæ apparent.

4. In speculis convexis sinistra videntur dextra, & dextra sinistra.

5. Si oculus ponatur in centro speculi concavi seipsum tantum cernet.

Authors.

Euclid and Peter Herigone have
written on this Subject.

Sect. IX.

Chymistry.

Chymistry is the Art of Analysing,
or Resolving Bodies by the opera-
tion of the fire into their compounding
principles.

The Chymists do generally affirm Mer-
cury, Salt, and Sulphur to be the com-
pounding principles of all compounded
things; which Doctrine is learnedly and
solidly confuted by the English Philoso-
pher, I mean the Famous Robert Boyle
in his Sceptical Chymist. Yet it can-
not be denied but that it is useful and
necessary likewise to mankind, upon the
account of those many excellent Medi-
cines

Authores.

Euclides, & Petrus Herigonius hoc
super argumento scripserunt.

Sectio Nona.

Chymica.

CHymica est ars reducendi corpora vi ignis in ea ex quibus constant principia. Fatentur Chymicorum plerique, asseruntque Mercurium, Sal, Sulphur, esse tria ut loquuntur, prima, seu constituentia omnium rerum compositarum principia: Quam doctrinam erudite more suo, ingenioseque ac solidis argumentis confutat Philosophus Britannicus celeberrimus merito *Boylius* in *Chymico suo Sceptico*.

Nemo tamen inficias ierit Chymiam & utilem esse generi humano, & necessariam ob tot generosa quæ

56 The Academy of Sciences.

cines it prepares to the great advantage of Physicians, and ease of their Patients, whereof these ensuing are some of the most considerable.

1. Aurum fulminans, or thundering Gold; a very good Sudorifick; it may be taken in the Measles from 2 grains to 6 in any convenient Electuary; it stops Vomiting, and is a hindrance to the activity of Mercury, or Quick-silver.

2. Vitriolus Lunæ taken inwardly, is prevalent against the Dropsie, and the Head-ach, of what sort soever; you may take it from 2 grains to 6 in any Specifick water; it is likewise a moderate purger.

3. Sal Jovis, is a great drier.

4. Magisterium Bismuth, softeneth the skin, and is good against Scabs and Itch, if you mix a drachm of it with 4 ounces of water, because it is a great destroyer of Salts and Acids, two general causes of most Distempers.

5. Sal Saturni taken inwardly, prevaieth against the Squinancy, the overflowing

parat medicamenta non mediocri medicorum emolumento, magnoque commissorum ipsis ægrorum levamine : Quæ hic subjunguntur, quædam sunt præcipuis.

1. *Aurum fulminans* sudores provocat ; adhiberi potest adversus morbillos, minima dosis sit gr. 2 maxima gr. 6 sistit vomitum, obstatque activitati Mercurii.

2. *Vitriolus luna* interius sumptus prævalet contra Hydropem, & quemcumque capitis dolorem : dosis minima gr. 2 maxima 6 in quacumque aqua specifica ; leniter quoque purgat.

3. *Sal Jovis* valde desiccat.

4. *Magisterium Bismuth*, emollit carnem, valetque contra scabiem & pruriginem si illius drachmam quatuor unciis aquæ commisceas, quia salia, & acida, geminas plerumque morborum causas destruit.

5. *Sal Saturni*, si sumatur interius prævalet contra anginam, immoderatum

58 The Academy of Sciences.

flowing of the Flowers, Piles, Dysentery, you may take it from 2 grains to 4 in Plantain-water.

6. *Oleum Saturni cleanseth and drieth up Ulcers.*

7. *Spiritus ardens Saturni resisteth powerfully putrefaction; it is beneficial to such as are troubled with too much Melancholy. You may take it from 8 to 16 drops, in any convenient liquor, a fortnight together.*

8. *Crocus aperitivus martis has a peculiar vertue against all distempers occasioned by obstructions. You may take it from 2 grains to 2 scruples in Lozenges or Pills.*

9. *Crocus martis astringens is of a peculiar vertue against the glitting of the Yard, the overflowing of the monthly Flowers and Piles; you may take it from 15 grains to a drachm in Lozenges or Pills.*

10. *Mars Diaphoreticus cures effectually the most melancholy distempers, as likewise Quartan Agues; you may take*

ratum menstruorum fluxum, Hæmorrhoides, Dyfenteriam ; dosi minima gr. 2, summa 4, in aqua plantaginis.

6. *Oleum Saturni* purgat, exsiccatque Ulcera.

7. *Spiritus ardens Saturni* potenter resistit putrefactioni ; nimia melancholia dejectis prodest : dosi 6, 8 aut 16 guttæ in quovis conveniente liquore per quatuordecim dies.

8. *Crocus aperitivus martis* peculiari virtute pollet adversus morbos ab obstructionibus ortos : dosi minima gr. 2 summa scrupuli duo in trapeziis, aut pilulis.

9. *Crocus martis astringens* peculiariter valet contra stillicidium penis, nimium menstruorum fluxum, & hæmorrhoides ; dosi ima gr. 15, summa, drachma in trapeziis, aut pilulis.

10. *Mars Diaphoreticus* reipsa curat plerosque morbos a melancholia ortos, atque febres etiam quartanas ;
dosi

60 The Academy of Sciences.

take it from 10 to 20 grains in Pills, or any convenient Liquor.

11. Sublimatum corrosivum eats up superfluous flesh, and drieth up Ulcers.

12. Sublimatum dulce, or Aquila alba, is very good against all Venereal Distempers; 'tis a great Deobstruent, and killer of worms; it may be taken in Pills from 6 grains to 30: 'Tis a mild purger.

13. Præcipitatum rubrum drieth up wounds, and consumeth superfluous or proud flesh.

14. Turbith minerale, or The Yellow Præcipitate, is a strong purger, and worketh both upwards and downwards; 'tis good against Venereal Distempers; you may take it in Pills from 2 gr. to 6.

15. Crudum Antimonium is a Sudorifick, but if you boyl it in any acid liquor, it will provoke you to vomit.

16. Regulus Antimonii purgeth upwards and downwards, if mixed with any Cathartick or Purger.

dosis 10 aut 20 gr. in pilulis, aut conveniente quopiam liquore.

11. *Sublimatum corrosivum* exedit superfluam carnem, exsiccatque Ulcera.

12. *Sublimatum dulce*, aut *Aquila alba* pollet adversus omnem veneream intemperiem: insigniter *Deobstruit*, vermiumque excidium est; si in pilulis sumitur; minima dosis gr. 6 summa gr. 30; leniter purgat.

13. *Præcipitatum rubrum* exsiccat vulnera, consumitque superfluam carnem.

Turbith menerale, aut *Præcipitatum flavum* valide purgat superne & inferne, valet adversus morbos venereos; dosis ima in pilulis gr. 2. summa gr. 6.

15. *Crudum Antimonium* est sudorificum, sed si illud in acido quopiam liquore concoquas, vomitum provocabit.

Regulus Antimonii Cathartico cuiuspiam immixtus superne, inferneque purgat.

17. Nihil

17. Vitrum Antimonii is the strongest Vomitory that is made of Antimony.

18. Antimonium Diaphoreticum resisteth powerfully Poison, and is likewise good against contagious Distempers, and against the Measles.

19. Flores Antimonii provoke to Vomit; and Rubri flores Antimonii as yet more; you may take them both from 2 gr. to 14, taking every quarter of an hour a spoonful of Broth wherein you have boyl'd a competent quantity of the Cream of Tartar.

20. Sulphur Antimonii is prevalent against the Distempers of the Breast; you may take 6 grains of it in any appropriated liquor.

Authors.

Paracelsus, Beguinus, Helmontius, and the deservedly Renowned Robert Boyle, &c.

17. Nihil ex Antimonio fit, quod potentius *Vitro Antimonii* vomitum excitet.

18. *Antimonium Diaphoreticum* resistit potenter veneno, valetque contra morbos contagiosos, & morbillos.

19. *Flores Antimonii* vomitum provocant fortiusque, adhuc, *Rubri flores Antimonii*; amborum dosis ima gr. 2 summa 15, fume interim quovis quadrante horæ Cochleare iusculi in quo cremoris tartari sufficiens mensura cocta fuerit.

20. *Sulphur Antimonii* pollet adversus omnes pectoris morbos; dosis gr. 6 in quovis idoneo liquore.

Authores.

Paracelsus, Helmontius, Beguinus,
meritoque celeberrimus ubique *Boyleus.*

Señt.

Sect. X.

Dioptrick.

Dioptick is that part of Astrology that searcheth out by Instruments the distance of the Sun, Moon, and other Planets. If you take it more generally, its chief end is to shew the apparent changes of our sight, and of visible objects look'd into through Prospective glasses.

It treats of the broken or refracted Rays of light, and this is its chief principle: When a Ray passeth through a thin middle into a thicker, it breaks in the Superficies of the thicker towards the perpendicular line; and when it passeth through a thick middle, or medium, to a thinner it deviates from the perpendicular line, which this obvious experiment demonstrates. Lay an Image, or any other visible object, in the bottom of a Vessel, and then go back till it vanish out of your sight; now if you fill this Vessel

Sectio Decima.

Dioptrica.

Dioptrica ea Astrologiæ pars est quæ instrumentis quibusdam distantiam Solis & Lunæ, aliorumq; planetarum indagat. Eam in genere si spectes, præcipuus ejusdem scopus est indicare apparentes visus mutationes, objectorumque per vitra optica ut microscopia, megaloscopia inspectorum, agit de radio fracto; hocque primarium hujus scientiæ principium est: Cum radius lucis progreditur a tenuiore medio ad densius, frangitur versus perpendicularem in superficie spissioris; cumque progreditur a medio spissiore ad tenuius, deviat a perpendiculari. Quod obvio hoc experimento manifestum fit: Imaginem aut quodvis aliud conspicuum objectum in fundo vasis cuiuspiam colloca: tum recede donec objectum non am-

F

plius

66 The Academy of Sciences.

sel with water, it shall presently be visible again, because the Ray coming from your eye, breaks downwards in the superficies of the water, as the same going streight up to the superficies of the water deviates from the perpendicular, because of the thinner air towards the eye, which renders the object visible again.

This Science treats likewise of Convex and Concave glasses, as they may work some change in the sight, and may help it. It gives an account of those whom Aristotle calls *Προσώτας*, who see remote things distinctly, and nearer objects confusedly; and why those whom we call *Μύωτας*, see both the remote and nearer objects confusedly.

It teacheth likewise amongst other things, 1. That those whom we call *Προσώτας* see distinctly some things that are represented by Convex glasses in a streight situation. 2. That they see not distinctly through a Convex glass any of those objects that are overturn'd.

3. It

plius appareat : Jam si vas hoc aqua impleas, oculis se mox imago oggeret : Quia radius lucis ab oculo ad fundum vasis porrectus frangitur deorsum in superficie aquæ versus Perpendicularem, ut idem ad superficiem ascendens ob tenuiorem aerem deviat a perpendiculari versus oculum, unde fit ut objectum rursus conspicendum se præbeat.

Insuper hæc Scientia agit de convexis concavisque vitris, quatenus visum aut variare, aut juvare possunt. Redditque pariter rationem cur ii quos *Aristoteles* $\pi\rho\iota\sigma\upsilon\tau\alpha\varsigma$ vocat, remota distincte videant, propinqua confuse ; & cur ii quos $\mu\iota\sigma\pi\alpha\varsigma$ dicimus tum remota, tum propinqua objecta confuse videant.

Inter alia pariter docet, 1. Eos quos $\pi\rho\iota\sigma\upsilon\tau\alpha\varsigma$ dicimus, quædam videre distincte quæ a vitris convexis recto in situ exhibentur. 2. Minime eos videre distincte per vitra convexa ullum eorum objectorum quæ eversa sunt. 3. Ostendit vitrorum

68 The Academy of Sciences.

3. *It sheweth the influence of Glasses applied one to another upon our sight.*

Authors.

Kepler, Maurolycus, Euclide, &c.
have written of this curious Science.

Sect. XI.

Moral Philosophy.

E*thica is that Art which directs us how to act always conformably to right reason: Its chief principle is this, Do as you would be done by.*

It teacheth us that God is our last end, because he only is Bonum Sufficiens, the Sufficient Good, nothing else being able to content us. It teacheth likewise that we can never love any thing but under the shew and appearance of Good, whereof it offereth three sorts, Honour Profit and Pleasure.

God

ap. trorum sibi invicem junctorum in vi-
sum nostrum operationem.

Authores.

&c. *Keplerus, Maurolycus, Euclides, &c.*
de curiosa hac Scientia scripsere.

Sectio Undecima.

Ethica seu Moralis Philosophia.

us
to
bis,
last
ffi.
lse
eth
ing
of
ts,
od
HÆC ea est ars quæ nos ad agen-
dum in omnibus conformiter
rectæ rationi dirigit: **P**rimarium ip-
sius principium hoc est, *Quod tibi vis
fieri, & alteri feceris.*

Docet Deum esse ultimum nostrum
finem quia ille solus est *Bonum Suffi-
ciens*, cum nihil aliud beatos nos effi-
cere queat: Docet pariter nihil nos
amare posse nisi sub specie boni, cujus
triplex genus proponit Jucundum,
Utile Honestum.

70 The Aacademy of Sciences.

God alone is our Objective Beatitude or Happiness, (as they speak in the Schools,) our Formal Beatitude is that operation of the Mind by which we possess God, which is the Intuitive Vision or Contemplation of God.

This Art sheweth that the Internal Principles of Humane Actions are either Natural, as Powers; or Acquired, as Habits: That the Understanding moves the Will to act, and the Will our Understanding; that a Habit being generated by the repetition of Acts, giveth the Soul not the real power of acting, but only enables it to act more easily.

Authors.

Aristotle, Seneca, Plato, Cicero, &c.

Sect.

Beatitudo nostra Objectiva, ut loquuntur Scholæ, solus Deus est, Formalis nostra Beatitudo est ea mentis operatio qua Deum possidemus, Intuitiva scilicet Dei Visio.

Hic Habitus docet principia interna actionum humanarum, aut esse nobis congenita, cujusmodi sunt Potentiæ; aut acquisita, cujusmodi sunt Habitus; docet intellectum movere voluntatem ad agendum, & vice versa; habitum actuum repetitione productum, animæ tribuere non ipsam quidem agendi facultatem, seu potentiam, sed majorem quamdam facilitatem.

Authores.

Aristoteles, Seneca, Plato, Cicero, &c.

70 The Aacademy of Sciences.

God alone is our Objective Beatitude or Happiness, (as they speak in the Schools,) our Formal Beatitude is that operation of the Mind by which we possess God, which is the Intuitive Vision or Contemplation of God.

This Art sheweth that the Internal Principles of Humane Actions are either Natural, as Powers; or Acquired, as Habits: That the Understanding moves the Will to act, and the Will our Understanding; that a Habit being generated by the repetition of Acts, giveth the Soul not the real power of acting, but only enables it to act more easily.

Authors.

Aristotle, Seneca, Plato, Cicero, &c.

Sect.

Beatitudo nostra Objectiva, ut lo-
quuntur Scholæ, solus Deus est, For-
malis nostra Beatitudo est ea mentis
operatio qua Deum possidemus, In-
tuitiva scilicet Dei Visio.

Hic Habitus docet principia in-
terna actionum humanarum, aut esse
nobis congenita, cujusmodi sunt Po-
tentia; aut acquisita, cujusmodi sunt
Habitus; docet intellectum movere vo-
luntatem ad agendum, & vice versa;
habitum actuum repetitione produ-
ctum, animæ tribuere non ipsam qui-
dem agendi facultatem, seu poten-
tiam, sed majorem quamdam facili-
tatem.

Authores.

Aristoteles, Seneca, Plato, Cicero, &c.

SECT. XII.

Geography.

GEOGRAPHY is the Description of the Earth, and its chief Parts..

Because Geographers talk much of the Longitude and Latitude of a place, 'tis of some use to know what is meant by these two words.

The Longitude then of a place, or its distance from the East, is an Arch of the Equator intercepted between the Semicircle of the first Meridian, and the Meridian of the place, according to the order of the Signs. The Latitude of a place, or its distance from the Equinoctial line, is the arch of the Meridian, intercepted between the Equator and the place proposed, being always equal to the elevation of the Pole, which is the arch of the Meridian intercepted between the conspicuous Pole and the Horizon, because the latitude of a place, as likewise the height

Sectio Duodecima.*Geographia.*

Geographia est descriptio terræ præcipuarumque ejus partium.

Quia Geographi multum loquuntur de Longitudine ac Latitudine loci, utile fuerit scire quid reipsa sint.

Longitudo itaque loci, aut ipsius distantia ab ortu, est arcus æquatoris inter semicirculum primi meridiani, & meridianum loci secundum ordinem signorum interceptus. Latitudo loci aut ejusdem distantia a linea æquinoctiali est arcus meridiani interceptus æquatorem inter, & locum propositum, estque semper æqualis elevationi poli, quæ est arcus meridiani horizontem inter, & conspicuum polum interceptus, quod tam latitudo loci,

74 The Academy of Sciences.

height of the Pole, together with the arch of the Meridian intercepted between the Pole & the Zenith, are equal to the fourth part of the Meridian or the Quadrant.

The whole World is now divided into four Parts, Europe, Asia, Africa, and America : Europe is bounded towards the North by the Hyperborean Sea, towards the West by the Atlantick Sea, and the Herculean by the Streights of Gibraltar and by the Ocean ; towards the East by the Egean Sea, the Hellespont, Propontis, Bosphorus Thracius, the Streights of Caffa, the Meotide Lake, the River Tanais, &c. till you come to a little Town called Turia, from whence 'tis bounded by a white line till you come to the White Sea.

The chief Parts of Europe are Germany, Spain, France, Great Britain, Switzerland, the Low Countries, Ireland, Denmark, Norway, Sweden, Poland, Italy, Croatia, Sclavonia, Dalmatia, Albania, Greece, Thracia, Bulgaria, Servia, Bosnia, Russia, Hungaria, Transylvania. Asia

loci, quam elevatio poli cum arcu meridiani inter polum & zenith intercepto, æquent quadrantem meridiani.

Totus terrarum orbis nunc dividitur in quatuor partes, *Europam, Asiam, Africam, Americam*: *Europa* terminos habet a septentrione Mare Hyperboreum, aut septentrionale, ab occidente Mare Atlanticum, fretum Herculeum, & Oceanum, ob ortu Mare Egæum, Hellespontum, Propontidem Bosphorum Thracium, Bosphorum Cimmerium, Lacum Mæotim, Tanais fluente usque ad oppidum Tuia, inde lineam rectam ad sinum usque Granduicum, seu Mare Album.

Præcipuæ *Europæ* partes sunt, Germania, Hispania, Gallia, Magna Britannia, Helvetia, Belgium, Dania, Suedia, Polonia, Italia, Croatia, Sclavonia, Dalmatia, Albania, Græcia, Thracia, Bulgaria, Servia, Bosnia, Russia, Hungaria, Transylvania.

Asia

Asia is bounded towards the North by the Scythian Sea, towards the East by the Sea called Eoum, towards the South by the Indian Sea or the Red Sea, towards the West by the Arabick Sreights and the Interne Sea.

Africa is joyn'd to Asia by an Isthme, or a narrow piece of Ground dividing two Seas: 'Tis bounded by several Seas, towards the East by the Red Sea, towards the South by the Ethiopian Sea, towards the West by the Atlantick Sea, towards the North by the Interne Sea.

The chief Parts of Africa we reckon to be those following, Barbary Biledulgeride, Sarra, the Countrey of the Negroes, Egypt, Ethiopia both superior and inferior, the Kingdom of the Abyssins.

America was wholly unknown to the Antients till about the year 1492, it was discovered by Christopher Columbus, a Genoese, in the name of Ferdinand King of Castile. 'Tis called America from Americus Vespucius, a Florentine,

Asia terminatur versus septentrionem Mari Scythico, versus ortum Mari Eoo, versus meridiem Mari Indico, aut Rubro, versus occidentem sinu Arabico & Mari Interno.

Africa Isthmo jungitur *Asiae*, terminos habet varias circum maria, ab ortu mare Rubrum, a Meridie Æthiopicum, ab occasu Atlanticum, a septentrione internum.

Præcipuas *Africae* partes sequentes numeramus, Barbariam, Biledulgeridem, Sarram, Regionem Nigritarum, Ægyptum Æthiopiam utramque superiorem & inferiorem, Regnum Abyssinorum.

America antiquis prorsus incognita fuit, donec sub annum quadringentesimum nonagesimum secundum supra millesimum detecta fuit a *Christophoro Columbo* Genuensi nomine *Ferdinandi* Regis *Castiliae*. *America* dicitur ab *Americo Vesputio* Florentino

time, who the first after Columbus, in the Year 1497, under the auspices of the King of Portugal, discover'd that Part of it that lyes beyond the Equinoctial line.

America is divided into two Parts, the one Norrthern, and the other Southern, or the Peruane America; they are both divided by an Isthme. The Northern America is called the Mexican, from its chief City Mexico. We know only those Countreys that lye near the shore, as Canada, the Land of Labrador, the adjacent Islands, New France or Norimbegra, Virginia or Apalchen, Florida, New Spain, New Grenade, California, Quivira, Anan, Jucatan, Guatimala, Hondura, Nicaragua.

In the Southern America you have Castile, the Golden Peru, Chili, Chica, the Countrey of the Pantagons, Brasilia, Caribana, Guiana, Biquiri or the Countrey of the Amazons, Pagan, Picorant, Moxas, Uram, Charchas.

tino qui primus post *Columbum* anno 1497. sub auspiciis Regis Lusitaniæ eam partem continentis detexit quæ ultra lineam æquinoctialem jacet.

America dividitur duas in partes alteram septentrionalem, meridionalem alteram aut Peruanam; utraque Isthmo dividitur, septentrionalis *America* vocatur *Mexicana* a præcipua ejusdem civitate *Mexico*. Regiones tantum littoribus adjacentes novimus, nempe Canadam, terram Laboratoris, atque insulas adjacentes, Novam Franciam five Norimbregam, Virginiam five Apalchen, Floridam, Novam Hispaniam, Novam Granatam, Californiam, Quiviram, Ananian, Jucatan, Guatimalam, Honduram, Nicaragnem.

In meridionali *America* sunt Castilio Aurea, Peruvia, Chili, Regio Pentagonum, Brasilia, Caribana, Guiana, Biquiri, Paguam, Picoram, Moxos, Uram, Charchas.

Authors.

Ptolomy, *the Great Atlas, the English Atlas*, Ortelius, Strabo, Solinus, Pomponius Mela, Philipp Cluvier, &c.

Sect. XIII.

Geometry.

THis Science teacheth us how to Measure the Earth, and to set limits to every Mans Lands; 'tis entirely contain'd in the Fifteen Books of Euclid's Elements: The first thirteen are acknowledg'd by all to be undoubtedly of this Author; the two last are ascrib'd by some to Hipficles of Alexandria.

Euclid's Elements may be divided into four Parts; the first Part, contain'd in the first six Books, treats of Plains; the second, consisting of the three other
fol-

Auctores.

*Ptolomeus, Magnus Atlas, Ortelius,
Strabo, Solinus, Pomponius Mela,
Philippus Cluverius.*

Sectio Decima tertia.

Geometria.

HÆC Scientia docet nos qui
terram metiamur, atque unius
cujusque prædiis limites præscriba-
mus : Integra continetur quindecim
Libris Elementorum *Euclidis* : Prio-
res tredecim sine ulla controversia
Euclidi ascribuntur ab omnibus, po-
steriores vero duo, a quibusdam *Hyp-
sici Alexandrino* tribuuntur.

Elementa *Euclidis* dividi possunt in
quatuor partes ; quorum prima pars
sex prioribus libris contenta, agit de
planis ; secunda, quæ ex tribus se-
quen-

82 The Academy of Sciences.

following Books searcheth into the properties of Numbers ; the third Part of Euclid's Elements , consisting of the tenth Book only, treats of commensurable and incommensurable Lines ; and lastly, the fourth Part comprehending the remaining Books, treats of Solids, or Bodies.

The first part of Euclid's Elements is again threefold ; the first four Books treat of Plains absolutely considered, of their equality and inequality ; the fifth treats of the proportion of Magnitudes in general ; the sixth sheweth the proportion of plain Figures.

Geometry may be divided into these three subordinate parts, Altimetry, Planimetry , and Stereometry ; Altimetry is the Art of measuring streight Lines, Planimetry is the Art of measuring Surfaces, Stereometry is the Art of measuring Solids or Bodies.

*A line is measured by a line of a known magnitude , and a superficies or surface by a square of a known magnitude, and
Solids*

quentibus conflatur, affectiones numerorum examinat; tertia pars Elementorum *Euclidis*, quæ solo libro decimo constat, de lineis commensurabilibus, ac incommensurabilibus agit; quarta denique pars, quam residui libri constituunt de solidis, aut corporibus differit.

Prima pars Elementorum *Euclidis* rursus triplex est; priores enim quatuor libri agunt de planis absolute spectatis, de eorum æqualitate, aut inæqualitate; quintus differit de proportionibus magnitudinum in genere; sextus planarum figurarum proportionibus exponit.

Geometria dividi potest in has tres partes subordinatas, in Altimetriad, Planimetriad, & Stereometriad; Altimetria est ars dimetiendi lineas rectas, Planimetria est ars dimetiendi superficies, Stereometria est ars dimetiendi solida, five corpora.

Lineas metiuntur lineæ notæ magnitudinis, superficiem metitur quadratum

84 The Academy of Sciences.

Solids are measured by a Cube of a known bulk.

Authors.

Euclid, Hero Mechanicus, Four-
nierius, Malapertius, Maginus, Cla-
vius, Nicolaus Tartalea *in Italian*,
Adrianus Metius, Samuel Marolois,
Simon Stevin, *and* Daniel Sant Bech.

Sect. XIV.

The Art of Dialling.

Gnomonica is the Art of Dialling,
or of making Sun-dials.

Of Sun-dials there are two sorts, some
are Pendulums, and others are Fix'd
ones. The Pendulums are those that
being hung up, or held up, shew the
hours by the height of the Sun, as the
Astrolabe, the Cylinder, the Quadrants,
the Astronomical Rings, and others of
the same kind.

The

dratum mensuræ notæ, solidaque metitur cubus notæ molis.

Authores.

Euclides, Hero Mechanicus, Fournierius, Malapertius, Maginus, Clavius, Nicolaus Tartalea Italice, Adrianus Metius, Samuel Marolois, Simon Stevinus, Daniel Sant Bechius.

Sectio Decima quarta.

Gnomonica.

GNomonica est ars construendi horologia solaria.

Horologia solaria dividuntur in pendula, & fixa : Pendula sunt ea quæ appensa, aut manu suspensa, horas indicant ope altitudinis solaris : Cujusmodi sunt Astrolabium, Cylindrus, Quadrans, Annuli Astronomici, aliaque ejusdem generis.

86 The Aacademy of Sciences.

The Fixed-dials require a certain situation, to shew the hours by the motion of the Sun from East to West, and upon this account they are more exact than the Pendulums.

The Centre of the Dial, is that point of the plane of the Dial in which the axis of the World is cut by the plane.

The perpendicular Style is a streight line drawn from the centre of the Earth to the plane of the Dial: The centre then of the World, or of the Earth in a Dial, is the top of the style, which is perpendicular to the plain of the Dial.

The Pole of the plane of the Dial, is the Pole of a great circle equi-distant from the plane of the Dial.

In all Astronomical Dials, that part of the style which by its shadow sheweth the hour, must be in the axis or axle-tree of the World.

The Italians reckon 24 hours, beginning from the setting of the Sun; the Babylonians reckon as many from the rising of the Sun, to the going down of the

Horologia stabilia, seu fixa, requirunt situm quemdam ut ostendant horas ope motus solis ab ortu in occasum, ideoque accuratiora sunt pendulis.

Centrum horologii est punctum plani horologii, in quo axis mundi secatura plano.

Stylus perpendicularis est recta a centro terræ ad planum horologii ducta, unde centrum mundi, sive terræ in horologio est vertex styli plano horologii normalis.

Polus plani horologii, est polus magni circuli paralleli plano horologii.

In omni horologio Astronomico ea pars styli quæ umbra horam ostendit, debet esse in axe mundi.

Itali numerant horas 24 initio ducto ab occasu solis ; *Babylonii* numerant totidem initio ducto ab ortu solis,

88 The Academy of Sciences.

the same ; but in the old Dials, the hours of the day, and of the night, are reckon'd separately, viz. 12 from the rising of the Sun, till the going down of the same ; and as many from the setting of the Sun, till the rising of the same.

Authors.

Maurolycus, Ptolomæus, Kircherus, &c.

Sect.

solis ; sed in antiquis horologiis horæ diei, noctisque separatim enumerantur, duodecim scilicet enumerantur ab ortu solis ad occasum, totidemque ab occasu ad ortum.

Authores.

Maurolycus, Ptolomæus, Kircherus, &c.

Sect.

Sect. XV.

Grammar.

Grammar is the Art of Writing and Speaking well ; it treats of Words and the Construction of Words.

This Art considereth two things in Words, the Letters, and the Syllables ; as likewise two sorts of Letters for some sound alone, and are called Vowels, as a, e, i, o, u, ; others sound not alone, but together with some other letter, and they are called upon this account Consonants, as these following, b, c, d g k, p, q, t, which letters are called Mutes, as f, l, m, n, r, s, x, z are called half Vowels.

A Syllable that has a full sound is made up either of a Vowel and a Consonant, or of Vowels and Consonants.

In Words, Grammar considereth their accent or tone, whether acute, or
grave,

Sectio Decima quinta.

Grammatica.

Grammatica est Ars recte loquendi, scribendique ; agit de vocibus, vocumque constructione.

Duo contemplatur in vocibus literas & syllabas, ut pariter duo genera literarum quædam enim solitarie sonant, & vocales dicuntur, ut *a e, i, o, u*, ; quædam solitarie non sonant, sed simul cum alia quapiam litera, & propterea consonantes dicuntur, cujusmodi sunt hæ literæ oppositæ *b, c, d, g, p, q, t*, quæ literæ dicuntur mutæ, ut *f, l, m, n, r, s, x, z* dicuntur semivocales.

Syllaba quæ integrum habet sonum, constat vel unica vocali, vel vocali addita consonante, vel vocalibus simul & consonantibus.

In vocibus Grammatica considerat accentum, seu tonum, sive acutum,
sive

92 The Academy of Sciences.

grave, or mean ; their Derivation and Etymology, their Composition and Simplicity ; their numbers ; if the word be a Noun, Plural, singular ; their Cases, Nominative, Genitive, Dative, Accusative, Vocative, Ablative : If the word be a Verb, it considereth the Tenses, as Present, Imperfect, Perfect, Future or to come.

It teacheth the Art of Construing words one with another, as the Adjective with the Substantive, in order to make a congruous Speech; either continued or interrupted : It distinguisheth the sentences by three notes, which we commonly call Comma, Semicolon, Colon, or as the Latins speak, Punctum.

The first is a short pause of respiration, which we express thus (,) the second is a longer pause, which we express thus (;) the third is a full pause, and finisheth the sense, which we mark thus (.)

Chief

sive gravem, sive medium, earum derivationem, originem, atque etymologiam, compositionem, simplicitatem, Numeros, si quæstio de Nomine sit, Singularem, Pluralem; Casus, Nominativum, Genitivum, Dativum, Accusativum, Vocativum, Ablativum; si quæstio de Verbo sit, considerat Tempora, ut Præsens, Imperfectum, Præteritum, Futurum.

Docet qui voces simul construere debeamus, ut Adjectivum cum Substantivo, ut fiat oratio congrua, continua, aut interrupta; distinguit sententias tribus hisce notis, quas designamus appellationibus hisce Comma, Semicolon, Colon, aut ut *Latini* loquuntur, punctum.

Prima nota indicat brevem a respirando cessationem, quam exprimimus hunc in modum (,) secunda est diuturnior cessatio quam exprimimus hunc in modum (;) postrema est plena cessatio, sensumque absolvit, quam ita notamus (.)

*Chief Authors.**Alvares and Despauter.*

Section XVI.

Hydrography.

Hydrography is a Description of the Waters, especially the Seas.

The Sea is the general Collection of Waters, 'tis divided into the Ocean and Mediterranean Sea: The Ocean is that Sea which surrounds the whole Earth, 'tis divided into the great Ocean, Gulfs and Streights.

The Ocean hath four different names, from the four opposite points of the World, from the East, 'tis called the Eastern Sea; from the South, the Southern; from the North, the Northern; 'tis divided into three vast Seas, Indian, or Red Sea; the Atlantick Sea, so called from

Authores primæ notæ.

Alvares, Despauterius, &c.

Sectio Decima sexta.

Hydrographia.

Hydrographia est descriptio Aquarum, maxime Marium.

Mare est generalis aquarum collectio, dividitur in Oceanum, & Mare Mediterraneum : Oceanus est mare quod universam terram ambit, dividitur in vastum, sinuosum, & fretum.

Oceanus quatuor sortitur appellationes a quatuor cardinalibus mundi partibus, ab oriente Eous dicitur, ab occidente Occiduus, a meridie Australis, a septentrione Septentrionalis ; dividitur in tria vasta maria *Indicum*, sive *Rubrum*, *Atlanticum* ab *Atlante*

96 The Academy of Sciences.

from Atlas, a Hill in Mauritania ; and the Pacifick Sea.

The Indian Sea reacheth from the Islands of Sumatra and Java to the Promontory of Good Hope, its chief Gulfs are the Gangetick Gulf, or the Gulf of Bengala, whose longitude is 120 deg. latitude 16 deg. the Persick Gulf, or Elcatif Sea, whose longitude is 76 deg. latitude 26 ; the Arabick Gulph, or the Red Sea, commonly called Mar di Meca, whose longitude is 70 deg. latitude 20 ; the Barbarick Gulf, whose longitude is 70 deg. latitude 4.

These are the chief Islands of the Ocean, Lerne, or Madagascar, or the Island of St. Laurence, longit. 75 deg. lat 20. Discuriada, or Zocorara, longit. 48 deg. lat. 11. the Maldives, longit. 105. lat. 5. Nanigeris, commonly called Zeilan, longit. 113. lat. 6. Taprobana, Sumatra, longit. 130. lat 0. Java the Great, longit. 140. lat. 10.

We reckon among the chief Islands of the Atlantick Sea, Albion, or Great Britain,

Atlante Mauritania monte sic dictum,
& in *Pacificum*.

Oceanus *Indicus* porrigitur ab Insulis *Sumatra*, & *Java* usque ad Caput *Bonæ Spei*: Ejus præcipui Sinus sunt *Gangeticus*, sive *Bengalensis*, cujus longitudo 120 graduum, latitudo 16 graduum. Sinus *Persicus*, cujus longit. 76 graduum, latitudo 20 graduum. Sinus *Arabicus*, aut Mare *Rubrum*, vulgo *Mar di Meca*, cujus longit. 70. lat. 20. Sinus *Barbaricus*, sive *Mare Asperum*, cujus longit. 70. lat. 4. —

Primariæ Oceani Insulæ sunt *Lerne*, aut *Madagascar*, seu Insula Sancti *Laurentii*, cujus long. 75. lat. 20. *Discuriada* aut *Zocotara*, cujus long. 48. lat. 11. *Maldiviæ*, longit. 105. lat. 5. *Nanigeris*, vulgo *Zeilan*, cujus longit. 113. lat. 6. *Taprobana*, *Sumatra*, longit. 130. lat. 0. *Java Major*, longit. 140. lat. 10.

Præcipuæ Insulæ Maris Atlantici sunt *Albion*, sive *Magna Britannia*,
H cujus

98 The Academy of Sciences.

Britain, *longit.* 22. *lat.* 52. Ireland, *longit.* 13. *lat.* 54. Hesperides, or the Islands of the Cap vert, *longit.* 353. *lat.* 17. Cuba, *longit.* 295. *lat.* 22. Jamaica, 298. *lat.* 18.

The Pacifick, or Southern Sea, lies between Asia, America, and the Magellanick Gulf; its chief Islands are Japan, *longit.* 170. *lat.* 36. The Molucs, *longit.* 157. *lat.* 1. Salomon's Islands, *longit.* 195. *lat.* 10.

Authors.

Herigone, Ortelius, Pomponius Mela, Joachim, Vadium, Fournier.

Sect.

ujus longit. 22. lat 52. *Hibernia*,
 ujus longit. 13. lat. 54. *Hesperides*,
 ut Insulæ *Promontorii viridis*, longit.
 arum Insularum 353. lat. 17. *Cuba*,
 ujus longit. 295. lat. 22. *Jamaica*,
 ujus longit. 298. lat. 18.

Mare *Pacificum*, five Meridionale
 cet inter *Asiam*, *Americamque*, &
 retum *Magellanicum*; Præcipuæ ejus
 insulæ sunt *Japonia*, cujus longit. 170.
 at. 36. *Molucæ*, longit. 157. lat. 1.
 insulæ *Salomonis* longit. 195. lat. 10.

Authores.

Herigonius, *Ortelius*, *Pomponius Me-*
Joachimus, *Vadiamus*, *Fournierius*.

Sect. XVII.

Logick.

Logick is the Art of Disputing well. The three operations of the Mind make up its whole object, which are Apprehension, Judgement or Affirmation and Illation. It teacheth, that the truth of any of those three operations consisteth in their conformity to their objects: So this compounded Apprehension, God Almighty, is true, because I apprehend God to be, what he really is, that is Almighty; you may easily apply this to the other two Operations.

Its two chief Principles are these Dictum de omni, and Dictum de nullo: The first signifieth, that whatever is generally affirmed of any thing, may likewise be affirm'd of whatever is contain'd under that thing, as if I say Every Animal is a living Creature, it follows, that a Bird is a living Creature.

Sectio Decima septima.

Logica.

Logica est ars recte differendi :
Ipsius objectum sunt tres mentis
operationes ; Apprehensio, Judicium
ut Affirmatio, & Illatio. Docet
veritatem illarum operationum in ea-
rum cum ipsis objectis conformitate
esse positam ; ut composita hæc ap-
prehensio, *Deus Omnipotens*, est vera,
quia apprehendo Deum, ut re ipsa
est omnipotentem : Quod reliquis
operationibus applicari facile potest.

Duo præcipua Logicæ principia
sunt ista, *Dictum de omni*, & *Dictum*
de nullo : Prius significat quicquid ge-
neraliter affirmatur de re quapiam,
affirmari idem posse de omnibus sub
eadem contentis, ut si dicam, omne
animal est vivens, licebit dicere om-
nis volucris est vivens. Posterius

ture. The second signifieth, that whatever is generally denied of any thing is denied likewise of whatever is contain'd under that thing; as if I say, No Animal is a Stone, then I may, and ought likewise to say, No Bird is a Stone, No Man is a Stone, &c.

Logick teacheth the Art of making a Syllogism, which consisteth of three Propositions, whereof the first two being granted, the Conclusion must necessarily be granted, because it was already implicitly admitted by him, who admitted of the Premises: As 'tis evident in this Syllogism, Every Man is a living Creature, Peter is a Man, ergo, Peter is a living Creature.

Logick is natural to all Mankind, because 'tis nothing else but the use of our Reasoning Faculty. Artificial Logick is made up of some Rules and Precepts that help our Reasoning Faculty.

Authors.

Aristotle, Arriaga, Ruvius, Guilminot, &c.

Sect.

innuit, quicquid generaliter negatur
de quapiam re, negari posse idem de
omnibus eadem comprehensis; ut si
dicam, Nullum animal est lapis; lice-
bit etiam dicere, Nulla volucris est
lapis; Nullus homo est lapis, &c.

Logica docet artem conficiendi Syl-
logismi, qui constat tribus propositio-
nibus: Quarum duæ primæ si semel
admittantur, tertia necessario admitti
debet, quia jam tacite admissa est ab
eo qui duas primas admisit, ut patet
in hoc Syllogismo, Omnis homo est
animal, Petrus est homo, ergo, Pe-
trus est animal.

Logica congenita est humano gene-
ri, cum nihil aliud sit quam facultatis
nostræ rationalis exercitium. Artifi-
cialis Logica sunt præcepta quædam
hanc facultatem juvantia.

Authores.

Aristoteles, Arriaga, Ruvijs, Guil-
minotius, &c.

SECT. XVIII.

Metaphysick.

THis Science considers Beings, as abstracted from all matter; and is so called, because it treats of things somewhat besides, above, or beyond Nature. It considereth two things in a Being, 1. Its Essence, which seems to have a real Being, though it does not exist, as a Rose in the midst of Winter. 2. Its Existence, which is actually in being, or by which a thing is actually in being, as the existence of a Rose is that by which it now is.

It considereth three properties of every Being, its Unity, Goodness, and Truth; Unity is that by which a thing is one, and not many. Truth or Verity, is the conformity of any thing to its real or consistent Principles, as true Gold consists in its conformity to the principles of
this

Sectio Decima octava.

Metaphysica.

HÆC Scientia considerat Entia, ut abstracta ab omni materia, nomenque hoc trahit inde quod agat de rebus aliquatenus præter, vel supra, aut ultra naturam.

Duo in Ente contemplatur, 1. Essentiam, quæ videtur esse verum Ens licet non existat, ut Rosa media Hyeme. 2. Existentiam quæ actu in rerum natura est, aut vi cuius aliquid actu existit, ut existentia Rosæ est id vi cuius Rosa nunc existit.

Contemplatur tres in quovis Ente proprietates, Unitatem, Bonitatem, Veritatem: Unitas est id vi cuius quidpiam est unum, & non multa. Veritas est conformitas unius cuiusque rei cum principiis veris, & constituentibus, ut veritas Auri, aut Aurum verum est ejusdem conformitas cum consti-

this Metal. The Metaphysical Goodness of things, is that essential perfection which is agreeable to them.

This Science treats likewise of Powers, Acts, Principles, and Causes, and proves, in opposition to Aristotle, and other ancient Philosophers, that the World was not eternal.

Authors.

Aristotle, Vasques, Suares, Valentia, &c.

SECT. XIX.

Musick.

Musick is a Science which teacheth us what belongs to the Theory and Practice of Harmony.

Melody is that which has a certain order compounded of Sounds and Intervals.

This

tuentibus hujusce Metalli principiis. Metaphysica Bonitas rerum est essentialis illa perfectio quæ rebus congruit.

Hæc Scientia agit pariter de potentiis, actibus, principiis, causis, contraque *Aristotelem*, aliosque antiquos Philosophos, probat mundum non fuisse æternum.

Authores.

Aristoteles, Vasques, Suares, Valentia, &c.

Sectio Decima nona.

Musica.

Musica est Scientia quæ Theoriam Praximque Harmoniæ docet.

Concentus est id quod certum habet ordinem ex Sonis & Intervallis compositum.

Hæc

This Science treats of these seven ensuing things, of Sounds, of Intervals, of Genders, of Constitutions or Systems, of Tunes, of Changes, of the making of Melody.

The Sound is a gentle falling of the voice upon the Note.

The Interval is comprehended under two Sounds, the one sharper than the other.

Authors.

Guido Aretine, in the Year 1028, Invented these six Syllables, ut, re, mi, fa, sol, la, of which mi, fa, or fa, mi, imply a half Tune, and the others following one another signifie a greater or lesser Tune; Euclid, Ptolomy, Aristoxenus, Faber Stapulensis, Boetius, John Kepler, Salinas, Zarlins, and Vincentius Galilæus in Italian.

Hæc Scientia de septem hisce sequentibus agit, de Sonis, de Interval-
lis, de Generibus, de Constitutioni-
bus, de Tonis, de Mutatione, de Me-
lopæia.

Sonus est concinnus vocis casus ad
unam extensionem.

Intervallum est id quod continetur
duobus sonis acumine, & gravitate
differentibus.

Authores. — — —

Guido Aretinus, anno salutis 1028,
invenit has sex Syllabas, *ut, re, mi,*
fa, sol, la, quarum *mi, fa*, vel *fa, mi*,
dimidium Tonum significant, ac se-
quentes sese invicem aliæ Tonum
absque discrimine majorem aut mino-
rem; *Euclides, Ptolomæus, Aristoxe-*
nus, Faber Stapulensis, Boetius, Joan-
nes Keplerus, Salinas, Zarlinus, Vin-
centius Galileus Italice.

Sect.

Sect. XX.

The Mechanicks.

THis Science considereth the quantity of Moving forces, and of Duration of the time in which the Motion is performed.

The gravity of a Body, is a certain capacity of falling downwards; the center of gravity, is that place or point from which if we conceive the Body to be suspended, whatever situation you may give it, it shall retain the same.

The Center of Magnitude, and of gravity, are not always the same, as 'tis evident in a Bowl half Lead, half Wood.

The Pendula diameter of gravity, or the handle, is a streight line drawn through the center of gravity perpendicularly to the Horizon.

No weight can rest, unless the pendula diameter of gravity, or handle, pass through the place upon which it leans,

Sectio Vigesima.

Mechanica.

MEchanica est Scientia quæ quantitates virium motuum, & temporum in quibus fit motus considerat.

Gravitas corporis est quædam potentia ad descensum.

Centrum gravitatis est punctum ex quo vel sola cogitatione suspensum corpus, quemcumque situm dederis retinet.

Centrum gravitatis, & centrum magnitudinis non sunt semper idem, ut patet in Sphæra plumbo-ligna.

Pendula gravitatis diameter, aut ansa est linea recta ducta per centrum gravitatis acta Horizonti perpendicularis.

Nullum pondus quiescere potest nisi pendula gravitatis diameter, aut ansa transeat per locum cui inni-

leans, or from which the weight is suspended.

In all Planes, the center of the figure, is likewise the center of gravity.

This Art teacheth in general, how to find out the ponderousness of every thing, and how to move things with little strength.

We must not forget in this place a sort of Mechanism, the knowledge whereof is of great concern for the good of Mankind; I mean that of Trusses, and Instruments fit for restoring by degrees, any part of the Body to its natural place and situation.

The burst Peritonæum sometimes gives way to the Intestines, at other times to the Caul. and not seldom, to both, to get out of their natural place, into the Groins, or the Scrotum, there causing a Rupture, called Enterocèle, or Hernia intestinalis; if the Bowels come out, an Epiplocele, or Hernia omentalis; if the Omentum or Caul be out. The Peritonæum is made up of two strong,

innititur, aut e quo suspenditur corpus.

In omni Plano figuræ centrum, centrum quoque gravitatis est.

Hæc ars docet in genere modum reperiendæ ponderationis, rerumque exiguis viribus movendarum methodum.

Non est prætermittendum hoc loco aliud genus mechanismi cujus notitia non parum humano generi profuerit; de mechanismo loquor, fasciarum, instrumentorumque, aut machinarum quibus paulatim quævis corporis pars ad debitum a natura situm reducatur.

Rupto Peritonæo interdum intestina, omentum interdum, sæpe & intestina, & omentum loco naturali excidunt in inguina, aut Scrotum, ibique Hernia producitur, dicta Enteroccele, aut Intestinalis, si prolabantur Intestina, vel Epiplocele, aut Hernia Omentalis si Omentum excidat.

Peritonæum gemina valida quidem

strong, but soft Membranes, which do so contain whatsoever is included in the Belly, that, when sound, nothing can fall out. In Women, the Os pubis is its utmost limit. In Men, its outermost Membrane reacheth further, and constitutes the first proper coat of the Testicles. In the Groin, it comprehends the seminal Vessels, as in a Sheath, called Processus, which being stretched or enlarged, or coming to burst, is the immediate cause of the lately mentioned Ruptures. We must not nevertheless imagine, that the Peritonæum cannot be distended, and burst in other places, and therein to cause a Rupture.

The causes which make the Peritonæum to Burst or Dilate, are falling, leaping, beating, bearing of heavy burthens, strong Vomitings or Coughing, Obstipation of the Belly, Winds pent in, and vehement motions of the Body.

But I can do no greater service to the Publick, than to inform the World of two of the best Artists I know of in this kind,

sed molli constat membrana, quæ ita concludit quicquid imo ventre comprehenditur, ut cum sanum corpus est nihil procidere possit. Peritonæum in mulieribus Osse pubis terminatur: In viris Tunica exterior ulterius procedit, ac Testiculorum involucrum primum proprium constituit. In Inguine vasa feminalia comprehendit, instar vaginæ, Processus dictæ: Processus hic laxatus, Dilatatus aut Ruptus est immediata herniarum mox commemoratarum causa: Non est tamen existimandum Peritonæum non posse distendi, rumpique etiam aliis in locis ibique Herniam producere.

Causæ Peritonæi Rupti, aut Dilatati hæ fere sunt, lapsus, saltatio, percussio, gravium onerum gestatio, vomitus violentior, aut tussis, constipatio ventris, flatus reclusi, vehementiorque omnis corporis motus.

Sed nihil forte utilius rei Publicæ præstitero, quam si hic nominatim indicavero duos peritissimos quos quidem

116 The Academy of Sciences.

kind, both living together in Black Fryers, in London, I mean the Famed Robert Smith, a Scotch Gentleman, and his Son-in-Law, Thomas Jewel, who give daily succesful proofs of their Skill in this kind of Mechanism, their Trusses of what kind soever being so light, so easie, and so fitted to all the motions of the Body, that they are not at all troublesome.

They likewise cure effectually any Deformity in humane Bodies, occasioned by the preternatural bending outwards, inwards, or downwards, of any part thereof, and by such ingeniously contrived Engines, as force Nature gently into its first place and situation.

dem norim hujusmodi mechanismi artifices simul conviventes *Londini* in ea regione urbis quæ *Black Fryers*, dicitur ; sunt autem ii celebris *Robertus Smith* Scotus, ejusque gener *Thomas Jewel*, qui quotidiana magnoque successu suæ hoc in genere mechanismi peritiæ experimenta exhibent : Ipsorum enim fasciæ cujuscumque generis, sive contra hernias Intestinales, sive Omentales, sive Umbilicales, sive Ventosas, aut contra aquosas, adeo leves sunt, gestatuque faciles, omnique corporis motui ita obsecundant, ut nihil omnino molestiæ gestantibus secum afferant.

Reipsa quoque prænominati tollunt quamcumque humanorum corporum deformitatem a præternaturali partis cujuspiam extrorsum, introrsum, aut deorsum distentione ortam, instrumentisque ac machinis ingenii ejusmodi quibus natura suaviter ad pristinum situm reducatur.

Authors.

Aristotle, Henry Monenthole, Joseph. Blancan, Guid Ubald, Stevin, Hero, Robert Vulturius, Cedren, John Baptista Porta, Joseph Boillot, Ranelli, Barbette, Brown, &c.

Sect. XXI.

Medica: Or the Art of Conserving and Curing Humane Bodies.

Hermes Trismegistus, a Fam'd Physician in Egypt, invented this necessary Art: 'Tis either Empirical, that is, grounded upon meer Experience; or Dogmatical, that is, grounded both upon Reason and Experience: Hippocrates and Galenus were the chief Masters of the Dogmatical part.

This Art is either Speculative or Practical;

Authores.

*Aristoteles, Henricus Monentholus,
Josephus Blancannus, Guidus Ubaldus,
Stevinus, Hero, Robertus Vulturius,
Cedrenus, Joannes Baptista Porta, Jo-
sephus Boillotus, Augustus Ranelli, Pau-
lus Barbettus, Johannes Brownius, &c.*

Sectio Vigesima prima.

*Medica : Sive Ars Conservandi & re-
staurandi Humani Corporis.*

H*ermes Trifmegistus* celebris apud
Aegyptios medicus necessariæ
huiusce artis inventor dicitur : Est au-
tem aut Empirica, hoc est quæ me-
ra experientia, aut Dogmatica, quæ ra-
tione & experientia nititur : Medici-
næ Dogmaticæ præcipui magistri exti-
tere *Hippocrates & Galenus.*

Est aut speculativa aut practica ;

etical ; the former considereth, 1. The nature, and the outward causes of Distempers, as the six things that are called not natural, because they are not the constituent parts of our Bodies, such we reckon the Air, Meat, Drink, Sleep, Watching, Motion and Rest, what we throw off, and what we retain, Excreta & Retenta ; our Passions, Plethora, or fulness, Cacochymy, or an ill habit of our blood. 2. It searcheth into the internal causes of our Distempers, as Wind, Worms, Acids.

The practical part of this noble and useful Art relates to the method of Curing, which is either performed by Alteration or Evacuation. Whether this Evacuation be wrought by Bleeding, Vomiting, Stool, Urine, Sweat, or insensible Transpiration ; and upon this account, its true object is the whole Materia Medica, or whatever may be subservient to the Physician's intention in either of the three Kingdoms, I mean, Animal, Vegetative, and Mineral.

The

prior considerat, 1. Naturam, causasque externas morborum, ut sex res dictas non naturales quia non sunt partes corporis humani constituentes, cujusmodi censemus aerem, cibum, potum, somnum, vigilias, motum, & quietem, excreta, & retenta, animi pathemata, plethoram, sive Plenitudinem, Cacochymiam, sive prævum sanguinis habitum. 2. Scrutatur internas morborum causas, puta flatus, vermes, acidum.

Practica pars nobilis hujus, utilisque artis methodum medendi spectat, quæ posita est in Evacuatione, & Alteratione, quocumque demum modo evacuatio contingat, sive venæ sectione, sive vomitu, dejectione, sudore, urina, aut insensibili transpiratione; quocirca verum ipsius objectum est tota materia medica, aut quicquid in regno Animali, Vegetabili, & Minerali, Medici scopo inservire poterit.

Porro

The whole Materia Medica may be reduc'd to the ensuing Heads.

1. *the Attenuating Remedies, as Eli- campe Roots, Wormwood Leaves, Camomile Flowers, the hot Seeds, Juniper, and Lawrel Berries, old Tallow, and Grease, especially that of a Wolf, and of a Bear, most Oyls, as of bitter Almonds, Walnuts, &c. the Plaisters of Betony, Diachylon, Oxycroceum, &c.*

2. *The Softening, as Marsh mallow Roots, Briony Roots, &c.*

3. *Such as dissolve Clots, as the Roots of round Birthwort.*

4. *The Deterging, as the Roots of Gentian, and Birthwort.*

5. *The Epicerasticks, that by a moderate moisture take off the sharpness of the humour, as Mallow, and Marsh-mallow Roots.*

6. *Alexipharmaca, that resist Venome, as Angelica Root.*

7. *The Thickening, as the Roots of Bugloss and Plantain.*

Porro totam materiam medicam ad
sequentia capita reducere fere pos-
sumus.

1. *Attenuantia*, ut Radices Ænulæ
Campanæ, Folia Absinthii, Flores Ca-
momillæ, Semina Calida, Baccæ
Juniperi, Lauri, Axungix vetustio-
res maxime Vulpina, & Ursina, Olea
pleraque, ut amygdalarum Amara-
rum, Nucum, &c. Emplastra de Be-
tonica, Diachylon, Oxycroceum, &c.

2. *Emollientia*, ut Radices Altheæ,
Bryoniæ.

3. *Grumos dissolventia*, ut Radices
Aristolochiæ rotundæ.

4. *Detergentia*, ut Radices Gentia-
næ, Aristolochiæ.

5. *Epicerastica* quæ moderata hu-
midate Acrimoniam humorum ob-
tundunt, ut Radices Malvæ, & Al-
theæ.

6. *Alexipharmaca* quæ resistunt Ve-
neno, ut Radix Angelicæ.

7. *Condensantia*, ut Radices Buglof-
sæ, & Plantaginis.

Cathar-

8. *The Cathartick, which either purge the Bile, as Cassia, Manna, Tamarinds, &c. or the Phlegm, as Carthamy, wild Saffron, Agarick, Turbith, Falep, or the Melancholy, as Sena Oake-Fern, or the Watery Humours, as Dwarf Elder, Elder-seed, Bark, Juice, Mechoaca.*

9. *The Vomitory, whether milder ones, as Sarabacca Leaves bruised in Dill Water; or stronger ones, as the Spirit of Tobacco, the Infusion of Tobacco, Crocus Metallorum, &c.*

10. *Diureticks, as Radish Roots, Parsley Roots, &c.*

11. *The Sudorificks, as Harts horn, Diascordium, Angelica Roots, &c.*

12. *The Repelling Remedies, as the Sloe-tree Roots, Tormentil Roots, &c.*

13. *The Emplasticks that stop the passages of the Body, as Lilly Roots, wild Comphry Roots, &c.*

14. *The Absorbing Remedies, which by a great faculty of drying, consume the moisture, as all Cenders, Vineger, Brine, &c.*

15. *The*

8. *Cathartica* que vel purgant Bilem, ut Cassia, Manna, Tamarindi, &c. vel Phlegma, ut Carthamus, Crocus Sylvestris, Turbith, Jalap, vel Melancholiam, ut Sena, Polypodium quercinum, vel Humores aquosos, ut Sambuci, & Ebuli Semen, Cortex, Succus, Mechoaca.

9. *Vomitoria*, sive mitiora, ut asari folia, aut validiora, ut Spiritus Nicotianæ, Infusio Nicotianæ, Crocus Metallorum., &c.

10. *Diuretica*. ut Radices Raphani, Apii.

11. *Sudorifica*, ut Cornu cervi, Diascordium, Radices Angelicæ.

12. *Repellentia*, ut Radices Pruni Sylvestris, Tormentillæ, &c.

13. *Emplastica* quæ corporis meatus obstruunt, ut Radices Symphiti, & Liliorum.

14. *Absorbentia*, quæ valida exsiccandi vi absumunt humorem, ut omnes Cineres, Acetum, Muria.

126 The Academy of Sciences.

15. *The Blistering, which raise Blisters, as the Cantharides, Mustard, Garlic, Water-cresses.*

16. *The Suppurating, that generate matter, as Marsh-mallow Roots, white Lilly Roots.*

17. *The Vulnerary, as Tormentil Roots, the Roots of both Comphreys.*

18. *The Sarcoticks, that remove whatever may hinder the breeding of Flesh, as the Roots of Birthwort, Tragacanth, Dragons Bloud, Sarcocolla, &c.*

19. *The Epuloticks, that generate a Callus, or Scarr, as Dragons Bloud, Myrtle Leaves.*

20. *The Anodines, as Marsh-mallows, and Lilly Roots.*

21. *The Narcoticks, which take away all feeling, as Oyl of Palm, Laurel, Turpentine, Opium, &c.*

22. *The Hypnoticks, that cause Sleep, as Requies Nicolai, Diascordium, Laudanum opiatum, &c.*

23. *Such as stop Bleeding, as Corals, the Bolus, Seal'd Earth.*

24. *The*

15. *Vesicatoria*, quæ vesicas excitant, ut Cantharides, Sinapi, Allium, Nasturtium.

16. *Suppurantia*, a quibus pus generatur, ut Radices Althææ, Liliorum Alborum, &c.

17. *Vulneraria*, ut Radices Tormentillæ, Consolidæ utriusque.

18. *Sarcotica*, quæ remouent quicquid Carnis generationem prohibet, ut Radices Aristolochiæ, Tragacantha, Sanguis Draconis, Sarcocolla.

19. *Epulotica*, quæ callum generant, aut cicatricem, ut Sanguis Draconis, Folia Myrthi.

20. *Anodina*, ut Radices Althææ, Radices Liliorum.

21. *Narcotica*, quæ omnem sensum tollunt, ut Oleum Palmæ, Lauri, Terebinthinæ, &c.

22. *Hypnotica*, quæ somnos conciliant, ut Requies Nicolai, Diascordium, Laudanum opiatum, &c.

23. *Sanguinem Sistentia*, ut Coralliæ, Bolus, Terra Sigillata, &c.

24. *Cepha-*

128 The Academy of Sciences.

24. *The Cephalicks, as the Roots of Birthwort, Betony Leaves, Galanga.*

25. *The Errhina, that purge the Brains and the Breast, by bringing down the superfluous pituite lying about the Meninges, as the Juice of Betony, the Powder of white and black Hellebore.*

26. *The Ophthalmicks for the Eyes, as Eye-bright, and Celadine water, and also their Juices.*

27. *Otica, that ease the pains of the Ears, as Laurel Leaves, Leeks, Radishes.*

28. *The Cardiacks, as the Roots of Zedaira, Great Leopards Bane, Thistle, and Balm water.*

29. *The Bechick, that render the humours contained in the Lungs and the Breast, fit to be thrown up, as the Syrup of ground-Ivy.*

30. *The Aromaticks, as Roots of Cyperus.*

31. *Splenica, such as cure the Spleen, as the Powder of Style, Valerian Roots.*

32. *The*

24. *Cephalica*, ut Radices Aristolochiæ, Galangæ, Folia Betonicæ.

25. *Errhina*, quæ cerëbum purgant & Thoracem, educta superflua circa meninges pituita, ut Succus Betonicæ Pulvis albi & nigri Hellebori.

26. *Ophthalmica*, ut aquæ & succi Euphrasiæ, & Chelidoniæ.

27. *Otica*, quæ levant aurium dolorem, ut Folia Lauri, Radices Porri, Raphani.

28. *Cardiaca*, ut Radices Zedoariæ, Doronici, aquæ Cardui Benedicti, & Melissæ.

29. *Bechica*, quæ humores in Thorace, & pulmone conclusos ad faciliorem Tussiendo ejectionem disponunt, ut Sirupus & succus hederæ terrestres.

30. *Aromatica*, ut Sirupi Absinthii, & Betonicæ.

31. *Splenica*, ut Pulvis ex Chalybe, Radices Valerianæ.

130 The Academy of Sciences.

32. *The Nephriticks, that help the Reins, as Marsh-mallow Roots, Sal Prunella, &c.*

33. *The Lithontripticks, that break the Stone, as Elecampane Roots, Galanga, &c.*

34. *The Hystericks, that cure Hysterical Fits, as Purslain Seed, the Seed of Agnus Castus, the Trochisques of Myrrh, &c.*

35. *The Arthriticks, that prevail against the Gout, as Elecampane Roots, Night-shade, Plantain, Marsh-mallow Leaves.*

Authors.

Hippocrates, Galen, Trallian, Actuarius, Cornelius Celsus, Avicenna, Sennertus, Riverius, Macasius, Regius, Willis, Barbette, Harvey the Inventor of the Circulation of the Bloud.

32. *Nephritica*, ut Radices Althææ,
Sal Prunellæ.

33. *Lithontriptica*, quæ calculum
frangunt, ut Radices Ænulæ Campa-
næ, Galangæ.

34. *Hysterica*, ut semen agni casti,
Portulacæ, Trochisci de Myrrha.

35. *Arthritica*, quæ valent adver-
sus Podagram, & Chiragram, ut Ra-
dices Ænulæ Campanæ, Folia Solani,
Plantaginis, Althææ.

Authores.

Hippocrates, Galenus, Trallianus,
Actuarius, Cornelius Celsus, Avicenna,
Sennertus, Riverius, Macasius, Regi-
us, Willisius, Barbetius, Harveius
circulationis Sanguinis Inventor, &c.

Sect. XXII.

The Art of Sailing.

ARS Nautica, or Hiftiodromica, *is that Art which teacheth how to direct a Ship through the Seas, to the propos'd Harbour.*

This Art requireth the knowledge of the Mariners Compass, and the Lead, of the Sea-coasts, Capes, Rocks, Promontories, Harbours, of the distances of one place from another, of the ebbing and flowing of the Sea, of the latitude and longitude of every place. It requireth likewise the knowledge of several Instruments fit to take the latitude of a place, as of the Cross-staff, of the Quadrant, of the Nocturnal, of the Plane Scale, of Gunter's Scale, &c.

The Mariners Compass is a round Plane, whose circumference is divided into 32 equal parts, by streight lines, called Rhombs, passing through the center.

The

Sectio Vigesima secunda.

Ars Nautica.

ARS Nautica, five Histiodromica
ea est quæ docet qui dirigi de-
beat navis per maria ad propositum
portum.

Hæc ars requirit notitiam pyxidis
Nauticæ, & Bolidis, oræ Maritimæ,
Promontiorum, Rupium, Portuum
distantiarum inter loca, æstuum Ma-
ritimorum, latitudinis & longitudinis
cujusque loci, instrumentorum pari-
ter variorum ad investigandam syde-
rum altitudinem, ut Baculi decussati,
Quadrantis, Nocturnalis, Sclarum
planarum, Sclarum *Gunteri*, &c.

Pyxis Nautica est planum rotun-
dum, cujus circumferentia in 32 par-
tes æquales dividitur rectis lineis per
centrum transeuntibus quæ Rhombi
dicuntur.

The height of the Pole, of so great benefit to Sailers, is found out thus: Observe first the height of the Sun at Noon-day, with an Astrolabe, or some other Instrument of that kind; then take the declination of the Sun, from the height, if the Sun declines from the Equator towards the Northern Pole; or add the declination of the Sun, to the observed height, if the Sun declines towards the Southern Pole; the remaining number, or the sum made up by Addition, gives you the height of the Equator, whose Complement to 90 degrees (as they speak) is always the height of the Pole. Thus if the height of the Equator above our Horizon be 60 deg. the height of the Pole is 30 deg. because 30 added to 60, make up 90; and if the Pole be elevated but 10 deg. the height of the Equator is 80, because this number is the Complement of that.

If their could be an Hour Glass, or a Clock, so contriv'd, as to fall but very little short of the Measure of Time

with

Altitudo poli Navigantibus adeo utilis sic invenitur : Observa primo Meridianam solis altitudinem ope astrolabii, aut alterius cujuscpiam instrumenti, tum substrahe declinationem solis ex altitudine jam inventa solis, ope instrumenti, si declinatio solis versus polum conspicuum sit, aut adde declinationem solis observatæ altitudini si sol declinaverit versus polum meridionalem, residuum aut summa futura est altitudo æquatoris, cujus complementum est semper altitudo poli : Itaque si altitudo æquatoris supra horizontem nostrum sit graduum sexaginta, altitudi poli futura est graduum triginta : Quia si addas 30 ipsis 60, summa futura est 90 ; & si polus 10 tantum supra horizontem gradibus extet, æquator supra eundem extabit 80, quia hic numerus est complementum illius.

Si posset construi Clepsydra, aut horologium quod ab accurata mensura temporis parum aberraret : Illius ope

with the help of this Clock, to the great advantage of Sailers, the differences of the longitudes might be found after this manner: When the Ship sets off, let the Clock shew the hour in the place from whence you sail'd, without discontinuing: If then we would know the longitude of the place in which we now are, let us, by observation of the Sun, find the hour in that place we chance to be in; which if it be the same pointed at by the Clock, or shewn by the Glass, 'tis certain we are in the same Meridian we were in at our first setting out; but if we find by observation, more hours than the Clock pointeth at, we have made a progress towards the East; if we find fewer hours, we are gone towards the West; and the differences of the longitudes may easily be known, if the differences of the hours be converted into degrees, and minutes of degrees.

Authors.

Seller, Everard, Wright, &c.

Sect.

inveniri possent hoc modo longitudinum differentia: Aptetur horologium ita ut dum solvit navis ostendat horas loci unde discedimus, deinde inter navigandum nunquam cesset: Cumq; libuerit scire longitudinem loci in quo sumus, ex observatione cœlesti inquiratur illius loci hora, quæ si omnino convenerit cum hora quam horologium indicat, certum erit nos esse sub eo unde discessimus meridiano, si vero plures horas observatione invenimus, quam horologium indicet, progressi sumus versus ortum, si pauciores defleximus versus occidentem, dignosceturque differentia longitudinum, si reducantur differentia horarum in gradus, & minuta graduum.

Authores.

Sellerius, Everardus, Wrightius, &c.

Sect.

SECT. XXIII.

Opticks.

THE Opticks, or Optica, gives us an account of various appearances of Objects. This Science treats of the streight Ray, as the Catoptrick of the reflected, and the Dioptrick of the refracted or broken Ray. These following Definitions belong to the Opticks. The proper Objects of Sense, are those that can be known but by one sense; and the common Objects, such as may be known by more than one sense. Light and Colour, are the proper Objects of our sight; the Light, upon its own account; and the Colour, by the help of Light. These following things, are the common Objects of our Senses, Bulk, Figure, Place, Situation, Distance, Continuity, Discontinuity, Motion, and Rest. The visuel Rays, are the streight lines, by which the frame of the visible Object is in a manner carried to the eye.

We

Sectio Vigesima tertia.

Optica.

Optica variæ objectorum apparentiæ causas demonstrat. Agit de radio recto, ut Catoptrica de reflexo, & Dioptrica de refracto. Ad Opticam spectant sequentes definitiones. Propria objecta sunt ea quæ ab uno tantum sensu percipi possunt. Communia sunt ea quæ a pluribus sensibus percipiuntur. Lumen & color sunt propria visus nostri objecta, lumen quidem ratione sui, color opae lucis. Communia visus objecta sunt ea quæ sequuntur, quantitas, figura, locus, situs, distantia, continuitas, discontinuitas, motus, & quies. Radii visorii rectæ lineæ sunt, quibus forma aspectabilis objecti ad visum porrigitur.

Inter

We may reckon among the chief principles of this Science, these following.

The visible object radiates from all its least parts, to all the least parts of the Medium, to which one may draw a streight line.

That is seen, and that only, from which to the eye the visuel Ray may be ezteneded.

The more bodies there appear between the eye and the object, the more remote the objects appear to be.

The Convergent Rays, are those that departing from the object, come together: Such are, the Rays of diverse parts of the object, which cut one another in the Chrystalline humor. The Divergent Rays, departing from the object towards the eye, recede from one another: The Rays of every point of the object, are divergent, till they come to the Chrystalline humour, beyond which they come together again towards the Retina.

We may reckon these following Propositions amongst the most considerable of the Opticks.

No

Inter præcipua hujus Scientiæ principia sequentia numerare licet.

Visibile radiat e quolibet sui puncto ad quodlibet punctum medii ad quod recta duci potest.

Id omne & solum videtur a quo ad oculum radius Opticus extendi potest.

Quo plura corpora oculum inter, & objectum apparent, eo remotius existimatur objectum.

Convergentes radii sunt ii qui recedendo ab objecto simul coeunt. Ejusmodi sunt radii variorum punctorum objecti qui se mutuo in humore ChrySTALLINO secant.

Divergentes radii progrediendo ab objecto versus oculum recedunt a se invicem donec ad humorem ChrySTALLINUM pervenerint ultra quem versus retinam coeunt.

Annumerare possumus præcipuis Opticæ ; propositiones sequentes.

Nullum

No visible object is seen at first altogether, and perfectly.

Magnitudes being in the same streight line, the remoter seem to be the lesser.

Parallel intervals seem to be nearer one another, the farther they are from the eye.

Rectangle Magnitudes being seen at a distance, seem to be round.

Equal Magnitudes being under the eye, those that are farthest from the eye, seem to be highest.

Authors.

You may reckon amongst the best Masters of the Opticks, Euclid, Aquilinius, Scheiner, Vitellio, Alhazane, Herigone, &c.

Sect.

Nullum visibile objectum simul totum, & perfecte videtur.

Magnitudinum in eadem recta quæ remotiores videntur, minores apparent.

Parallela intervalla eo magis ad se invicem accedere videntur quo sunt remotiora ab oculo.

Rectangulæ magnitudines procul visæ apparent rotundæ.

Æqualium magnitudinum sub oculo quæ remotiores, videntur altiores.

Authores.

Inter præcipuos Opticæ doctores censere possumus *Euclidem, Aquilonium, Alhazenum, Scheinerum, Vitellionem Herigonium, &c.*

Señ.

Sect. XXIV.

Perspective.

Perspective representeth every object seen in some Diaphane, or transparent Medium, through which the visual Rays are terminated or bounded on the object; and generally what is seen through something, as through the Air, Water, Clouds, Glass, and the like, may be said to be seen in Perspective.

The chief Contents of this Science, may be referred to these following Heads.

The Ray is a streight line drawn from the Eye to the Glass perpendicularly.

That point is called Primary, on which falls a perpendicular line drawn from the Eye to the Glass.

The projection of a line, is not a crooked line.

The object being a Point, there is but one

Sectio Vigesima quarta.

Perspectiva.

Perspectiva quodlibet objectum exhibet conspectum per medium quodpiam diaphanum, per quod radii visorii transeuntes terminantur ad objectum, & generaliter loquendo quicquid per aliud quidpiam videtur, ut per aerem, per aquam, per nubes, per vitrum, & quæcumque alia sunt ejusmodi, dici possunt videri in Perspectiva.

Quæ præcipui momenti hæc Scientia continet ad sequentia Capita reduci queunt. Radius primarius est recta ab oculo in vitrum ad angulos rectos ducta.

Præmarium punctum dicitur id in quod cadit perpendicularis ab oculo in vitrum ducta.

Projectio lineæ non est linea curva.

Cum objectum est punctum uni-

L

cus

one visual Ray drawn from the Object to the center of the Eye, and this Ray is called the Axis, or Central, as being the most vivid, and the strongest of all.

If the Object be a streight line, the visual Rays make a triangle. If the Object be a Surface, plane or spherical, the visual Rays represent a Pyramide.

Ichonography is the Pourtraiture of the Platform or Plane upon which we would raise any thing.

Orthography is the Pourtraiture of the fore part of the Object.

Scenography representeth the Object wholly elevated and perfect, with all its Dimensions and Umbrages on all sides.

The Horizontal line in Perspective, is taken from the height of our eye: This is the chief piece of the Picture, and which ought to be the rule of the dimensions and height of the Figure.

The point of Perspective, or sight, is made by the central Ray above the Horizon.

cus tantum est radius visorius ab objecto ad centrum oculi ductus, hicque radius dicitur Axis, aut radius Centricus, estque omnium vivacissimus, ac fortissimus.

Si objectum recta sit linea, radii visorii conflant triangulum.

Si objectum sit superficies plana, aut sphaerica, radii visorii conficiunt pyramidem.

Ichonographia est delineatio plani super quod erigere quidpiam volumus.

Orthographia est delineatio anterioris objecti partis.

Scenographia exhibet objectum omnino elevatum, perfectumque una cum omnibus ejusdem dimensionibus, umbrisque undique.

Linea horizontalis in Perspectiva vocitur ab altitudine oculi: Hæc præcipui in pictura momenti est, regulæque esse debet dimensionum, altitudinumque figuræ.

Punctum Perspectivæ, aut visus fit centrico supra horizontem radio.

Authors.

Amongst the chief Writers of Perspective, you have Roger Bacon, John Baptist Porta, Stevin, Marole, John Cousin, Daniel Barbaro, Vignola, Serlio, du Cereau, Salomon de Caus, Guidus Ubaldus, Niceronius, &c.

Sect. XXV.

Poetry.

Poetry is the Art of making Verse and Poems : In order to this, it teacheth the quantity of Syllables, whether they be short or long, doubtful or common, I mean, either short or long for pleasure.

It teacheth what feet every Verse compounded of, that feet are made of Syllables of different quantities, as Spondee consists of two long syllables ;

Authores.

Inter præcipuos Perspectivæ scriptores hi censentur *Rogerus Bacco, Johannes Baptista Porta, Stevinus, Marolus, Johannes Cousinus, Daniel Barbaro, Vignola, Serlio, du Cerceau, Salomon de Caus, Guidus Ubaldus, Niceronius, &c.*

Sectio Vigesima quinta,

Poetica.

POetica est ars pangendorum carminum quem in scopum docet quantitatem syllabarum an scilicet sint longæ, breves, dubiæ, aut communes, hoc est pro arbitrio, breves aut longæ.

Docet ex quibus pedibus quilibet versus constet, pedesque constare ex syllabis variæ quantitatis, Spondæum

for instance, Doctos, and Pyrrichius; of two short, as Rota; a Dactyle consists of one long, and two short, as Pectora.

A Poem implieth a Fiction: Upon this account, Verses that contain no Fiction, are not strictly considered a Poem; and he that gives a meer Matter of Fact, without any ingenious Fiction adapted to the Subject, is rather styl'd a Versificator, than a Poet.

Verses are either denominated from their Inventors, as Sapphick Verses, from the Greek Poetress Sappho, the first Inventress; as Pindarick, from Pindarus, or from the feet whereof they consist; as Iambick, from the Iambicks of which they are compos'd, or from the matter they express; as Heroick, from the Praises of Great Men; as Elegiack, from sad Narratives, or from the number of feet, as Hexameter, and Pentameter, the first having six, and the other five.

puta, duabus longis, ut *Doctos*, *Pyr-richium*; ex duabus brevibus, ut *Rota*; *Dactylum* ex una longa & duabus brevibus, ut *Pectora*.

Poema fictionem necessario requirit: Quare versus nullam fictionem complexi stricte loquendo Poema dici nequeunt: Qui rem absque ingenioso ullo commento, ut reipsa contigit, carmine describit, Versificator potius quam Poeta dicendus est.

Versus denominantur aut ab inventoribus, ut Sapphici versus a puella Græca quæ *Sappho* dicebatur, prima inventrice, ut Pindarici a *Pindaro*; aut a pedibus ex quibus constant, ut Iambici ab *Iambis*, ex quibus fiunt; aut a materia quam exprimunt, ut Heroici a laudibus Heroum, Elegiaci a mæstis narrationibus; aut a numero pedum, ut Hexameter, & Pentameter a numero pedum sex, & quinque.

152 The Academy of Sciences.

The Scansion of a Verse, is the measuring of a Verse by its feet. The Cefure is the making of a short syllable long at the end of a foot.

Authors.

Aristotle, Horace, Alvares, Despauter, Waller, Cowley, Dryden, &c.

SECT. XXVI.

Philosophy.

P*hilosophy, if we take it generally, is the love of Wisdom; if more particularly, the knowledge of Natural Bodies, or of the Natural Causes of Things: The Aristotelian Philosophy acknowledgeth three Principles of every thing, Matter, Form, and Privation; for we can conceive nothing to be generated without these three; for if I conceive the generation of fire in wood, I must*

Scanſio verſus eſt ejuſdem ope pedum dimenſio. Cæſuta eſt productio ſyllabæ brevis ſub finem pedis.

Authores.

Ariſtoteles, Horatius, Alvares, Deſpaunterius, &c.

Seçtio Vigefima ſexta.

Philofophia.

Philofophia ſi latius ſumatur, amorem ſapientiæ ſonat, ſi proprius & ſpecialius, eſt corporum naturalium, aut naturalium cauſarum cognitio. *Philofophia Ariſtotelica* agnoſcit tria rerum dum generantur principia, Materiam, Formam, & Privationem. Nihil enim generari concipimus niſi hæc tria concipiamus: Si enim concipio generationem ignis in ligno

must of necessity apprehend the Wood as the Matter, as likewise the Privation of the Fire in the Wood, and also the Form of Fire taking place of that of Wood.

This Philosophy resolveth all difficulties relating to Bodies, by Matter, Privation, and Form, Occult Qualities, and such like pretences to humane Ignorance: So every Mixt, according to Aristotles Principle, is compounded of Matter and Form: This Matter, the Peripateticks call the Subject of all Forms; and this Form, the Act of Matter; and both together, the two compounding Principles of all compounded Things

Aristotles Followers teach, that Nature is such an Enemy to a Vacuum, that to shun it, she forceth heavy things upwards, and light things downwards.

The New Philosophy holds but two simple Principles of all things, Matter, and Motion; that, as the Material Cause; this, as the Efficient. The For-
mal

ligno, necessario concipio lignum, ut materiam, & privationem pariter ipsius in ligno, formamque ignis formæ ligni succedentem.

Hæc Philosophia omnes fere difficultates ad corpora spectantes ope materiæ, privationis, & formæ resolvit, atque occultarum qualitatum beneficio, aliisque humanæ ignorantie velamentis; unumquodque igitur mixtum juxta *Aristotelica* principia componitur ex materia, & forma: Hanc materiam vocant *Peripatetici* Subjectum omnium formarum, & hanc formam Actum materiæ, componentiaq; duo principia si simul sumantur, omnium rerum compositarum.

Aristotelis Sectatores docent Naturam Vacuo adeo esse inimicam, ut illius vitandi gratia gravia sursum cogat, & levia deorsum.

Nova Philosophia duo admittit simplicia omnium rerum principia Materiam, & Motum, illam ceu causam Materialem hanc ut Efficientem. Formalis

156 The Academy of Sciences.

mal Cause of things, which School-men call a Substantial or Accidental Form, being nothing else, according to the Modern Philosophers, but a certain Texture of the compounding Particles; and by the variety of Textures every where obvious, or by the various Modifications of Matter, they give us a rational account of all the differences we observe among Corporeal Beings.

Authors of the School Philosophy.

Aristotle, and all his Commentators, as Averroes, Alexander Aphrodisæus, &c.

Authors of the New Philosophy.

Descartes, Verulam, the Honourable Robert Boyle, who in not a few things, has out-done them both, and is deservedly styl'd abroad, The English Philosopher; he being indeed, the Honour of his Nation, as well as of his Family.

Sect.

malis enim rerum causa, quam Scholastici formam Substantialem vocant, aut Accidentalem, nihil aliud est juxta Philosophos recentiores, quam textura quædam partium componentium. Hacque contextus varietate ubique obvia, aut variis materiæ Modificationibus, rationalem, facilem, obviamq; nobis reddunt rationem omnium quæ observamus, corporea inter entia discriminum.

Authores Philosophiæ Scholasticæ.

Aristoteles ejusque Commentatores, ut *Averroes*, *Alexander Aphrodisæus*, &c.

Authores novæ Philosophiæ.

Gassendus, *Cartesius*, *Verulamius*, illustrissimus *Robertus Boyleus*, qui in multis his omnibus palmam præripuit, meritoque Philosophus *Britannicus* cognominatur; estque reipsa Nationis suæ, & nobilissimæ Familiæ ornamentum & decus.

Sect.

Sect. XXVII.

Rhetorick.

Rhetorick is the Art of Speaking well; the duty of a Rhetorician, is to speak pertinently to the Subject, in order to perswade, and his chief scope must be to perswade by his discourse.

Rhetorick consists of four parts, Invention, Disposition, Elocution, and Pronunciation: Invention is the contriving of an Argument fit to perswade, and those Arguments are always taken from some of these ensuing Heads.

1. From the Definition, when we declare what the thing is.

2. From the Division, when we distribute a thing into all its parts.

3. From the Etymology, when we shew its Origine and signification.

4. From

Sectio Vigesima septima.

Rhetorica.

Rhetorica est ars bene dicendi ; officium Rhetoris est loqui apposite ad scopum hoc est ad persuadendum ; præcipuus enim ipsius scopus est persuadere dictione.

Rhetorica quatuor constat partibus, Inventione, Dispositione, Elocutione, Pronunciatione : Inventio est exco-
gitatio argumenti ad persuadendum idonei ; hæc autem argumenta ducuntur semper ab aliquo sequentium capitum.

1. A Definitione, cum declaramus quid res sint.

2. A Divisione, cum rem distribuimus in omnes partes.

3, Ab Etymologia , cum indicamus ejusdem originem & significationem.

4. A

4. *From the Species, when we frame an Argument from that particular kind of thing the Subject we treat of, belongs to.*

5. *From the Genus, when we bring some proof from that general thing the Subject we treat of, is contain'd under.*

6. *From the Similitude.*

7. *From the Dissimilitude.*

8. *From Contraries.*

9. *From Opposites, that can never concur together.*

10. *From Comparison.*

11. *From the four Causes, Efficient, Material, Formal, and Final.*

12. *From the Antecedents and Consequents of a thing.*

Disposition is the orderly placing of the things invented: This orderly placing consists of five things; Exordium, by which the Speaker prepares the minds of his Auditors, to what he is to say. Proposition, when the Orator declares what he intends to make out. Narration, when

4. A Specie, cum argumentum quodpiam ducimus a particulari illa rerum specie, ad quam res, de qua agimus spectat.

5. A Genere, cum probationem de sumimus a generali illa re, sub qua id quod sub litem cadit, continetur.

6. A Similitudine.

7. A Dissimilitudine.

8. A Contrario.

9. Ab Oppositis, quæ nunquam concurrere queunt.

10. A Comparatione.

11. A Quatuor causis, Efficiente, Materiali, Formali, & Finali.

12. Ab Antecedentibus & Consequentibus.

Dispositio est ordinata rerum inventarum collocatio: Hæc ordinata collocatio his quinque constat, Exordio, quo parat Orator auditorum animos ad ea quæ dicturus est. Propositione, cum Orator quid probaturus sit exponit.

M

Narra-

when he relates the Matter of Fact, with all its circumstances. Confirmation, when he proves his Proposition. Peroration, when the Orator endeavours to move the affections of the Hearers, by a fit Elocution.

Elocution, made up of Tropes, as they speak in the Schools, by which Words change their signification; and of figures, which are an Elegant, and not Vulgar manner of speaking, is the ornament of Speech.

Pronunciation relates to the Voice, and the Gesture; by the first, we please the Ear; by the second, the Sight. These forementioned things (necessary to the compleating of an Orator) being seldom found together in any Eminency, gave occasion to Cicero to say, that We scarce find a good Orator in a whole Age.

Authors.

Aristole, Cicero, Suarez.

Sect.

tionem, cum materiam facti omnibus vestitam appendicibus enarrat. Confirmationem, cum propositionem suam probat. Perorationem, qua conatur Orator auditorum animos apta Elocutione movere.

Elocutio, composita ex Tropis, quibus voces ad alienam significationem traducuntur, & figuris quæ sunt elegantes, & non vulgares loquendi formulæ, est totius Orationis ornamentum.

Pronunciatio spectat vocem, & gestum, ista recreamus aurem, hac oculum: Præmemorata hæc quæ in perfecto Oratore requirimus cum vix uspiam simul summo in gradu concurrant, impulerunt *Ciceronem* ut diceret vix singulis ætatibus singulos tolerabiles Oratores extisse.

Authores.

Aristoteles, Cicero, Snares.

Sect. XXVIII.

The Doctrine of the Sphere.

SPhærica is a Science which treats of the Sphere, whether Artificial or Natural.

The Sphere is a solid figure comprehended under one surface, to which all the streight lines drawn from one of those points that are within the figure, are equal one to another.

The Center of the Sphere, is the fore-mentioned point.

The Axis of the Sphere, is a streight line drawn through the Center, and terminated on each side in the surface of the Sphere; about which the Sphere turneth round.

The Poles of the Sphere, are the two extreme points of the Axis.

This Science demonstrates these following Propositions.

Sectio Vigesima octava.

Sphærica.

Sphærica est Scientia quæ agit de Sphæra, sive arte facta, sive naturali.

Sphærica est figura solida comprehensa una superficie, ad quam ab uno eorum punctorum quæ intra figuram sunt, omnes rectæ linæ ductæ sunt æquales inter se.

Centrum Sphæræ est punctum præmemoratum.

Axis Sphæræ est recta per centrum ducta & utrimque terminata in superficie Sphæræ circa quam volvitur Sphæra.

Poli Sphæræ, sunt duo extrema puncta axis.

Hæc Scientia sequentes propositiones demonstrat.

166 The Aacademy of Sciences.

1. *The Sphere toucheth but in one point the Plane by which it is not cut.*

2. *In the Sphere, great Circles cut one another into equal parts ; and if they divide one another into equal parts, they are great Circles.*

3. *In the Sphere, the Pole of a great Circle is distant from the circumference of the same Circle, a full Quadrant, or a fourth part of the great Circle.*

4. *In the Sphere, Parallel Circles are about the same Poles ; and Circles that are about the same Poles, are Parallel.*

5. *In the Sphere, there are no more than two Circles, both equi-distant and equal.*

This Science teacheth how to find the Center, and the Pole of any Sphere, and sheweth likewise all the properties of the Circles of the Sphere.

Authors.

Theodosius, Maurolycus, Sacrobosco,
Clavius, Mestlinus, Blancanus.

Señ.

1. Sphæra Planum a quo non secatur, non tangit in pluribus punctis uno.

2. In Sphæra, maximi circuli sese mutuo bifariam secant, & qui sese mutuo bifariam secant, sunt maximi.

3. In Sphæra, polus maximi circuli abest a circumferentia ejusdem circuli quadrante maximi circuli.

4. In Sphæra, paralleli circuli circa eosdem polos sunt, & qui circa eosdem polos in Sphæra sunt, sunt paralleli.

5. In Sphæra non sunt plures circuli æquales, & paralleli quam duo.

Hæc Scientia præterea docet qui centrum, polumque cujuscumque Sphæræ invenire possimus, indicatque pariter proprietates circulorum Sphæræ.

Authores.

Theodosius, Maurolycus, Sacrobosco, Clavius, Mestlinus, Blancanus.

Sect. XXIX.

Divinity.

Theology, or Divinity, is wholly directed to the Glory of God, and Salvation of Mankind. The Speculative part of it, proposeth to us things that we are to believe, as whatever concerns Gods Attributes and Perfections, the Immortality of our Souls, and whatever is contain'd in the Apostolick Creed. The Practical part, proposeth to us things that we are to do, viz. whatever is contain'd in the Decalogue.

The immediate object of Divinity, as it relates to Christians, we reckon whatever concerns Christ, directly, or indirectly; as in general, the Old and New Testament. And in particular, the Prophecies relating to his Coming, his Miracles, his Doctrine, and the Conversion of the World by his Apostles: If then, a Man knew no other Divinity, but

Sectio Vigesima nona.

Theologia.

Theologia ad Dei gloriam, salutemque animarum tota dirigitur. Speculativa pars proponit nobis credenda, ut quæ spectant ad attributa divina, immortalitatem animæ, quæque in symbolo Apostolorum continentur. Pars practica faciendâ nobis proponit, quæcumque scilicet Decalogus nobis exhibet.

Theologia prout spectat Christianos, immediatum habet objectum quicquid refertur ad Christum directe, aut indirecte ut in genere tum Antiquum, tum novum Testamentum; & magis speciatim Prophetias ad ipsius adventum spectantes, miracula, doctrinam, hominumque ab Apostolis conversionem: Quocirca si nullum quis aliam novit Theologiam quam quæ divinorum attri-

but that which gives an account of Gods Attributes, he is not upon this account a Christian Divine, but a Philosopher, or Deist.

Christian Divinity, besides the afore-said things, teacheth all kind of Vertues, as Charity, Humility, Patience, Chastity, Adoration, Prayer to, and Praise of God, Faith, Obedience, Repentance, &c. It will have us moreover to pardon and love our very Enemies; which no other Religion Commands: It offers to us the fundamental points of Christian Religion, Christs Godhead, Passion, Death, Resurrection, &c. and (as I was saying) whatever is contained in the Creed.

Authors.

The Master of Sentences, Thomas Aquinas, Scotus, Hammond, Lightfoot, and several other Doctors of the Church of England.

Sect.

attributorum reddit rationem non hoc nomine Christianus Theologus, sed Philosophus potius, aut Deista merus dici debet.

Theologia Christiana præter superius commemorata docet omnia virtutum genera, humilitatem, patientiam, castitatem, adorationem, orationem, laudem Dei, fidem, obedientiam, pœnitentiam, &c. Vult insuper nos non tantum remittere injuriam, sed & diligere inimicos: Quod nulla nisi Christiana religio injungit. Proponit nobis religionis Christianæ fundamenta, Christi Deitatem, passionem, mortem, resurrectionem, &c. atque ut superius dicebam quicquid in symbolo continetur.

Authores.

Magister Sententiarum, Thomas Aquinas, Johannes Duns Scotus a patria, Hammondius, Lightfootius, alique quam plurimi Ecclesiæ Anglicanæ Doctores.

Sect.

Sect. XXX.

Spherical Trigonometry.

Spherical Trigonometry teacheth us to measure Spherical Triangles, that is Triangles in the surface of the Sphere, made by the Arches of great Circles.

Those sides of a Spherical Triangle are of the same kind that both exceed, or both fall short of 90 degrees; but they are of a different sort, if the one exceed, and the other fall short of 90 degrees.

This Science demonstrates these following Propositions.

1. In all Spherical Triangles, any side whatsoever, is less than a Semi-circle.
2. In all Spherical Triangles, any two sides, howsoever they be consider'd, are greater than the third.

Sect.

Sectio Trigesima.

Trigonometria Sphærica.

TRigonometria Sphærica docet nos modum dimetiendi triangula Sphærica, hoc est triangula ex tribus arcubus maximorum circulorum, in superficie Sphæræ composita.

Latera ea trianguli Sphærici ejusdem sunt affectionis quæ simul excedunt, aut deficiunt a quadrante, aut nonaginta gradibus, sed non sunt ejusdem generis si unum latus excedat, & alterum sit infra nonaginta gradus.

Hæc Scientia sequentes hæc propositiones demonstrat.

1. In omni triangulo Sphærico quodvis latus quomodocumque sumptum est minus semi-circulo.

2. In omni triangulo Sphærico duo latera reliquo sunt majora quomodocumque sumpta.

3. Omne

3. *Of a Spherical triangle equilateral if each side be a quadrant, or of 90 deg. all the angles are streight; and if each side be less than the quadrant, all the angles are obtuse.*

4. *In all Spherical triangles, when the angles are all acute, all the arches are less than the quadrant.*

5. *In all Spherical triangles, the three angles are greater than two streight angles, and lesser than six.*

Authors.

Kepler, Afraganius, Julius Higinus, Garcaeus, Robert Hues, Adrianus Metius.

Sect.

3. Omne triangulum Sphæricum æquilaterum, si singula latera sunt quadrantes, habet singulos angulos rectos, si vero quadrante minora, obtusos.

4. In omni triangulo Sphærico cujus omnes anguli sunt acuti arcus singuli quadrante minores sunt

5. Omnis trianguli Sphærici tres anguli duobus quidem rectis sunt majores, sex vero rectis minores.

Authores.

Keplerus, Afraganius, Julius Higinus, Garcaus, Robertus Hues, Adrianus Metius.

Señ.

Sect. XXXI.

The Rectiline Trigonometry.

THe Rectiline Trigonometry teacheth us how to measure Triangles made of streight lines.

A streight line, is the shortest way between two extremes.

Between two extremes, there can be but one streight line.

Two streight lines can not cut one another, but in one point.

An angle is measured by degrees, so a streight angle is an angle of 90 degrees, an acute angle is an angle of fewer than 90, as an obtuse angle contains more than 90 degrees.

A line falling even down upon another line, without inclining either to the one side, or to the other, is called a Perpendicular line, and makes two streight angles.

Parallel

Sectio Trigesima prima.

Trigonometria Rectilinea.

TRigonometria Rectilinea docet qui triangula ex rectis lineis composita metiri oporteat.

Linea recta est brevissima duo inter extrema via.

Duo inter extrema unica tantum duci potest recta.

Duæ rectæ nequeunt se invicem nisi in puncto secare.

Angulum metiuntur gradus, angulus rectus est angulus 90 graduum, acutus angulus graduum pauciorum, angulus obtusus plures nonaginta gradibus gradus continet.

Linea in aliam utrimque incidens ex æquo Perpendicularis dicitur, duosque utrimque rectos angulos constituit.

178 The Academy of Sciences.

Parallel lines, are those that are equidistant one from another.

This Science demonstrates this Proposition, of great use in Mathematicks, that the three angles of all Rectiline triangles, are equal to two streight ones.

All the angles of a triangle, may be acute, but there can be but one streight, or obtuse.

If one of the three angles of a triangle be streight, the two others are equal to a streight angle.

Who knows the degrees of two angles, knows the degrees of the third, because all three make up 180 degrees.

All the angles of a triangle being equal, all the sides are likewise equal.

Authors.

Euclid, Clavius, Arnauld, Malapertius, Fournier, &c.

APPEN.

Lineæ parallelæ, sunt lineæ æquo a se invicem intervallo distitæ.

Hæc Scientia non exiguæ Mathematicis in disciplinis utilitatis hanc propositionem demonstrat, omnis trianguli Rectilinei tres anguli duobus rectis sunt æquales.

Omnes anguli trianguli rectilinei possunt esse acuti, sed unus tantum rectus esse potest, aut obtusus.

Si unus trium angulorum trianguli sit rectus, duo reliqui recto æquales sunt.

Qui novit duorum angulorum gradus tertii anguli gradus novit, simul enim tres anguli conficiunt numerum 180.

Quoties omnes anguli trianguli sunt æquales, omnia latera quoque æqualia sunt.

Authores.

Euclides, Cicero, Clavius, Arnould, Malapertius, Fournierius, &c.

A N

APPENDIX.

Pointing at some of the chief Authors of this, and the foregoing Ages. By Authors, here are meant, those that are really such, and the first Inventors of any useful piece of Knowledge.

R E A D E R,

THou mayest rest satisfied with this very short and imperfect account of some of the chief new Inventions, either of this, or of the past Ages, since I design, at more leisure, to write a larger Treatise of this Subject, as likewise to set down the particular times every thing was Printed in, that so the unjust dealing both of Domestick and Foreign Transcribers, who have so often stolen the greatest, or (at least) the best part of their Writings from
the

APPENDIX.

Quosdam e precipuis hujus, superiorumque seculorum Authoribus indicans. Hic nomine Authorum intelliguntur ii, qui reipsa ejusmodi sunt, hoc est primi utilis cujuscumque Scientie, seu cognitionis Inventores.

Æ Qui bonique consulat Lector brevem hanc imperfectamque descriptionem eorum, quæ sive hoc, sive præterita sæcula invenerunt; cum enim per otium licebit, statui ampliorem hoc super argumento conscribere tractatum, ipsumque denotare tempus quo quidlibet e prelo in lucem prodiit, eo consilio ut Transcriptores tum domestici, tum extranei qui toties

An Appendix.

the Honourable Robert Boyle, Hook, Descartes, Gassendi, and Others, may to their confusion, be discovered; and to the great encouragement of all ingenious Men, who shall the more willingly venture abroad their Notions, and new Contrivances, in what kind soever, if they are once secured from usurping Authors.

I shall begin with the deservedly Famous Robert Boyle, though I may dispatch in one word, what relates to this Noble Author, if I say, as truly I may, that whatever he has publish'd, is in every respect new, both as to the subject it self, the Arguments he proposeth, and the particular Method: But because the curious Reader will not be satisfied with this general account, I come to particulars, but shall speak but of a very few things, as designing, at greater conveniency, a more accurate History of this Great Author's new Contrivances, whether Notions, Engines, or Experiments. As likewise whatever the Natives of this Island have invented towards the promoting of useful Learning.

The famous Air-Pump was invented by the Honourable Robert Boyle: He giveth a full account of it, in his Discourse of Physico Mecha-

Appendix.

ties illustrissimo *Boyllo*, *Hookio*, *Cartesio*, aliisque maximam aut præcipuam saltem lucubrationum suarum partem furripuere meritas ipso detecti furti pudore luant pænas : Quo fiet ut ingeniosi quique quæcumque de novo excogitant, facilius in lucem emissuri sint si tutos se ab Authoribus aliena usurpantibus noverint.

Initium ducam a *Roberto Boylio* jure merito jam ubique celeberrimo, quamvis quæ hic nobilem hunc Authorem spectant verbo absolvere queam, si dixero ut vere possum, quicquid ab ipso in lucem editum est esse omnino novum, siue argumentum ipsum spectes, siue rationes ab ipso propositas, siue denique peculiarem ipsius methodum : Sed quia his in genere dictis Lectoris curiositati factum satis non fuerit, propius quædam attingam paucissima tantum commemoraturus, ut qui per otium accuratiorem scribere decreverim Historiam tum eorum quæ magnus hic Author primus adinvenit puta Notionem *Machinarum*, *Experimentorum*, &c. Tum eorum quæ indigenæ hujus insulæ ad utilium Scientiarum propagationem excogitarunt.

Celeberrima Antlia Aeria ab illustrissimo *Roberto Boylio* excogitata fuit : Plenam ejusdem descriptionem tradit ibi ubi de

An Appendix.

Mechanical Experiments ; by the help whereof, he proves the *Elastick Power and Spring of the Air*, and several other wonderful Phenomena's relating to the nature, spring, expansion, pressure, weight of the *Air*, &c.

He contrived the Experiment concerning the different parts and redintegration of *Salt-Peter* ; whence he concludes, that motion, figure, and disposition of Parts, may suffice to produce all secondary affections of Bodies, and so bannisheth the substantial forms and qualities of the Schools.

But because I design a larger account in another Treatise of this Noble Author's new Inventions, I shall only tell you here, that his *Physiological and Experimental Essays*, his *Sceptical Chymist*, his *Usefulness of Experimental Philosophy*, his *History of Cold*, his *Experimental History of Colours*, his *Hydrostatical Paradoxes*, his *Origine of Forms and Qualities*, his *Free Enquiry into the Receiv'd Notion of Nature*, his *Reconciliableness of Specifick Remedies to the New Philosophy*, his *History of Humane Bloud*, his *Discourse of Final Causes*, not yet published ; as likewise all his other Treatises contain as many new Notions and Experiments almost as lines.

Appendix.

Experimentis Physico-Mechanicis ; illius ope elasticae aeris virtutem, atque elaterem probat, variaque alia, quæ merito miremur, Phænomena ad naturam, elaterem, expansionem, pressionem, gravitatemque aeris spectantia.

Primus ille Author experimenti est de diversis partibus, & redintegratione Salis-petræ, unde concludit motu, figura, partiumque dispositione secundarias omnium corporum affectiones produci posse, pro-scribitque proinde substantialia Scholarum formas, & qualitates.

Sed quia fusius alibi scribere statui de iis quæ nobilis hic Author primus invenit, hic tantum suggeram, *Physiologicis ipsius tentaminibus, atque Experimentalibus, Chymico Sceptico, Utilitate Experimentalis Philosophiæ, Historia Frigoris, Experimentalis Historia Colorum, Hydrostaticis Paradoxis, Origine Formarum & Qualitatum, Libera in Receptam Naturæ Notionem disquisitione, Concordia Remediorum Specificorum & novæ Philosophiæ, Historia Humani Sanguinis, Dissertatione de Causis Finalibus*, nondum edita ; variisque aliis ejusdem operibus, tot novas contineri Notiones, Experimenta-que fere quot versus.

An Appendix.

I shall not forget in this place, what that very Learned and Ingenious Gentleman, Sir Robert Gordon, of Gordistoun, has lately invented; I mean, his famous Water-Pump, a piece of Mechanism, far beyond the Contrivances of all foregoing Ages, in this kind, as I shall easily make out by the following account of this useful Engine.

This new Pump draweth twice as much water as any other; it is wrought with half the force, and costs half the price, and takes up but half the room. The Experiment, performed at Deptford the Twenty Second of March, in presence of my Lord Dartmouth, and the Commissioners of the Navy, appointed to give account of it to the King, was as follows.

In a Sixth-Rate Frigate, this new Pump did fill the Gaged Cistern of two Tuns, in one minute and forty five seconds; and the Ship-pump did the same in six minutes and some more, each Pump being wrought by four men.

In a Fourth-Rate Frigate, this Pump being wrought by twelve men, did fill the Cistern in thirty one seconds; and the Ship-Pump, being wrought by six men, fill'd it in four minutes and some more.

The

Appendix.

Non prætermittam hoc loco quod doctissimus, ingeniosissim usque *Rob. Gordonius*, a *Gordistown* eques, nuper adinvenit; notissimam scilicet jam ubique hauriendis Aquis Antliam, mechanismi quoddam genus, quod superiorum ætatum hoc in genere arte facta longe exsuperet, ut sequente utilis hujusce machinæ descriptione facile demonstrabo.

Nova hæc Antlia duplo plus quavis alia aquarum trahit; & dimidiis tantum viribus dimidioque solum constat pretio, & dimidium tantum modo implet locum. Experimentum hoc *Deptfordii* vigesimo secundo Martii coram Comite *Darmouthensi* Commissariisque classis regię, ad rem ut reipsa erat Regi referendam constitutis ita se habebat.

Imposita nova hæc Antlia navi bellicę sexti ordinis mensuratam duorum doliorum Cisternam minuto uno, secundis quinque supra quadraginta implevit: Notaque navis Antlia idem sex minutis & aliqua parte septimi præstitit, utramque autem quatuor tantum operarii agebant.

Navi bellicę quarti ordinis imposita cooperantibus interim duodecim operario Cisternam secundis triginta, & uno implevit, navisque Antlia ope sex nautarum candens quatuor minutis, & aliqua parte quinti implevit.

Præ-

An Appendix.

The chief Authors of new Discoveries in Anatomy, we reckon to be these following: Fabricius ab aqua pendente discover'd the Valve of the Veins, as the Valve at the entrance of the great Gut Colon was found out by Bauhinus; the Milky Veins of the Mesentery, by Asellius; the Receptacle of the Chyle, by Pequet; the Ductus Virsungianus, by George Virsung, of Padua; the Lymphatick Vessels, by Dr. Joliffe, Bartholin, and Olaus Rudbeck; the internal Ductus salivaris in the Maxillary Glandule, by Dr. Wharton, and Dr. Glisson; the Glandules under the Tongue, Nose and Palate; the Vessels in the nameless Glandules of the Eye; the Tear Glandule, by Nicolas Steno; a new Artery, called Arteria Bronchialis, by Frederick Rusch; the Circulation of the Bloud, by Dr. Harvey, though some, upon no very good grounds, ascribe it to Paulus Venetus, and others to Prosper Alpinus, and Andreas Cæsalpinus.

The Art of making Salt water Fresh, was lately invented in England, whereof the deservedly famous R. Boyle gave a very rational account, in a Letter written upon this Subject.

Arithmetick was either invented, or much promoted by Pythagoras, by Euclid, not the Euclid that was Contemporary to Plato, and
Hearer

Appendix.

Præcipuos rerum Anatomicarum detectores sequentes numeramus, *vid. Fabricium ab aqua pendente*, qui detexit Valvulas venarum, ut Valvula, sub introitum magni intestini quod *Colon* dicunt inventa fuit a *Bauhino*; venæ Lactææ mesenterii ab *Asellio*, receptaculum Chyli a *Pequeto*, ductus *Virsungianus* a *Georgio Virsung* Paduensi; Lymphatica vasa a Doctore *Joliffeo*, *Bartholino*, & *Olao Rudbeckio*, internus ductus Salivaris in Glandula maxillari a Doctore *Whartono*, & Doctore *Glissonio*, Glandulæ sub lingua, naso, palato, vasa sub innominata Glandula oculi, Glandula lacrymalis a *Nicolao Stenone*; nova Arteria *Bronchialis* dicta a *Frederico Ruschio*, Circulatio Sanguinis ab *Harvæo*; quamvis alii quidam non sat probabiliter eam ascribant *Paulo Veneto*, ut nonnulli *Prospero Alpino*, & etiam *Andrea Casalpino*.

Ars aquæ Salsæ Dulcorandæ inventa nuper in *Anglia* est, de qua celeberrimus merito *Boynus* conformia omnino rationi in Epistola quadam hoc super argumento scripsit.

Arithmeticam aut invenerunt, aut multum promoverunt sequentes Authores, *Pythagoras*, *Euclides*, non is qui cœvus fuit *Platoni*, auditorque *Socratis*, sed celeberrimus

An Appendix.

Hearer of Socrates, but the Famed Mathematician of that Name, who was after Aristotle, and at Ninety years distance from the former; by Diaphantus, Psellus, Apuleius, Cardan, Gemma Frisius, Clavius, &c.

Neper invented the Logarithms, by the help whereof we perform all the operations of Arithmetick by Addition and Substraction. He invented likewise an easie, certain and compendious way of accounting by Sticks, called Rabdology, as also Computation by Neper's Bones.

The Telescope was invented by James Metius, of Amsterdam, though commonly ascribed to Galile, who indeed, improved it.

Torricellius found the Barometer, whereby we weigh the Air itself.

Printing, according to Polidore Vergile, was found by John Cuttemberg, of Ments, in Germany, though Others give the Honour to one Fust, of the same City; and Some, to Lawrence, a Burgher of Harlem. The Chineses knew this Art before the Europeans.

Flavius Goia, of Amalphis, in the Kingdom of Naples, is thought to be the Inventor of the Mariners-Compass, three hundred years since.

Appendix.

rimus Mathematicus hujus nominis qui post *Aristotelem* floruit, annis post priorem nonaginta; *Diaphantus*, *Psellius*, *Apuleius*, *Cardanus*, *Gemma Frisius*, *Clavius*, &c.

Neperus invenit Logarithmos quorum ope omnia Arithmeticae praescripta exequimur sola *Additione*, & *Subtractione*. Invenit pariter facilem, certam, brevemque numerandi methodum ope Baculorum, quam *Rabdologiam* dicunt, aut *Computationem* per *Ossa Neperi*.

Telescopium inventum fuit a *Jacobo Metio*, *Amstelodamensi* licet vulgo *Galileo* tribuatur, qui quidem perfectius illud multo reddidit.

Torricellius invenit Barometrum quo instrumento aerem ipsum metimur.

Ars Typographica teste *Polydoro Vergilio* inventa fuit a *Johanne Cuttembergio*, *Moguntiano*, licet quidam hunc honorem tribuant cuidam *Fustio* ex eadem civitate, & nonnulli *Laurentio* civi *Harlemensi*. *Sinenses* hanc *Artem* prius *Europaeis* noverant.

Flavius Goia, ab *Amalphi*, in Regno *Neapolitano* creditur jam trecentis abhinc annis pyxidem *Nauticam* invenisse.



